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AIR QUALITY ASSESSMENT
REPORT FOR THE YEAR 1974
CLARK-MOHAVE AQCR

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1. INTRODUCTION

This assessment report is designed primarily for use within EPA and is written for those already familiar with the Federal requirements and activities in the field of air quality surveillance and data management. The report contains an assessment of existing air quality at each monitoring site within the AQCR in relation to the National Ambient Air Quality Standards (NAAQS). Past trends are identified and, if possible, explained, and future trends are predicted when the available data warrant it.

The report is short so that it may be read quickly. No attempt was made to include all kinds of summaries that might be useful in the evaluation of an AQCR; rather the number of summaries has been kept to the minimum number that will (1) allow evaluation of progress toward meeting the air quality standards, and (2) indicate trends in air quality.



2. SUMMARY

Reported measurements of air quality indicate that the region has the following status with respect to the primary and secondary air quality standards.

Standard	Status for 1974	Areas Below Standard*
Suspended Particulate Annual, primary (75 $\mu\text{g}/\text{m}^3$)	exceeds (134 $\mu\text{g}/\text{m}^3$)	Las Vegas, Fire Sta. #2 Henderson, post office Las Vegas, Sunrise power No. Las Vegas Las Vegas, Shadow Lane [Yuma, Las Vegas Sahara Hotel, Las Vegas Casino Center]
Annual, secondary (60 $\mu\text{g}/\text{m}^3$) (Guideline, only)	exceeds (134 $\mu\text{g}/\text{m}^3$)	All of the above plus: McCarran terminal bldg. [Las Vegas stadium, McCarran flight path]
24-hour, primary (260 $\mu\text{g}/\text{m}^3$)	exceeds (345 $\mu\text{g}/\text{m}^3$)	Las Vegas, Fire Sta. #2 Henderson, post office
24-hour, secondary (150 $\mu\text{g}/\text{m}^3$) (Guideline, only)	exceeds (345 $\mu\text{g}/\text{m}^3$)	The two stations above plus: Las Vegas Sahara Hotel, McCarran terminal bldg. No. Las Vegas Yuma Las Vegas, election warehouse Las Vegas, Shadow Lane Las Vegas, Sunrise power Logandale
Sulfur Dioxide Annual, primary (80 $\mu\text{g}/\text{m}^3$) 24-hour, primary (365 $\mu\text{g}/\text{m}^3$) 3-hour, secondary (1300 $\mu\text{g}/\text{m}^3$)	complies (11 $\mu\text{g}/\text{m}^3$) complies (34 $\mu\text{g}/\text{m}^3$) complies (value not available)	No data from Clark County or any urban areas of Yuma and Mohave Counties
Carbon Monoxide 8-hour, prim. & sec. (10 mg/m ³) 1-hour, prim. & sec. (40 mg/m ³)	exceeds (16.3 mg/m ³) complies (38 mg/m ³)	Las Vegas center city; no data from other sites
Oxidant/Ozone 1-hour, prim. & sec. (160 $\mu\text{g}/\text{m}^3$)	exceeds (310 $\mu\text{g}/\text{m}^3$)	Las Vegas center city; no data from other sites
Nitrogen Dioxide Annual, prim. & sec. (100 $\mu\text{g}/\text{m}^3$)	complies (734 $\mu\text{g}/\text{m}^3$)	No data from Yuma Co. or urban areas of Mohave Co.

The suspended particulate levels are similar to those measured in 1972 and 1973, and no significant trends are indicated. Sulfur dioxide levels in Mohave County continue to be low, but a possible upward trend may be developing in the Davis Dam area. No data are available for the other counties. Monitoring for carbon monoxide, nitrogen dioxide, and ozone was just started in 1974, so no trends can be identified.

[Rapid population growth is occurring in the Las Vegas area and is expected to continue well into the 1980's. Much slower growth is predicted for Kingman and Yuma. Especially vigilant surveillance of air quality is indicated for the Las Vegas area since pollutant emissions will increase as the population grows, and a deterioration of air quality could occur.]



3. DESCRIPTION OF AQCR

This section of the report presents a qualitative description of the features of the AQCR that influence air quality but do not change appreciably from year to year as a result of man's activity.

3.1 GEOGRAPHY AND POPULATION CENTERS

The Clark-Mohave Interstate AQCR covers the southern tip of Nevada (Clark County) and the western edge of Arizona (Mohave and Yuma Counties). (See Figure 3-1).

The Colorado River bisects Mohave County, then turns to form the western boundary of that county, as well as Yuma County to the south. The river's elevation is about 1,200 feet above mean sea level over its up-river extent in back of Hoover Dam, 650 feet at Lake Mohave, 450 feet at Lake Havasu, and near 100 feet by the time it passes south of Yuma, at the southern edge of the AQCR.

The terrain also decreases from north to south, with mountains to about 7,000 feet found in northern and central Mohave County, lowering to 3,000 feet in the northern section of Yuma County.

The populated portions of the AQCR are found along the course of the Colorado River and in the Las Vegas area of Clark County, Nevada.

Agriculture is carried on along the Colorado and Gila Rivers in Yuma County, but the major industry in the region is tourism.

The northern section of the AQCR includes the Lake Mead National Recreation Area and the Grand Canyon National Monument. All along the Colorado River course, where it provides the border between Arizona and California, are recreational facilities and retirement or second-home sites geared to desert living.

A different type of tourist industry is typified by the greater Las Vegas area. Here the tourist is oriented to the entertainment activities that provide a basis for the largest urban area in the AQCR.

Also present in the Las Vegas area are significant industrial sources (see Figure 3-3) where chemical and mineral processing and gasoline distribution are carried on at a number of large industrial complexes.

Other population centers in the AQCR are: Boulder City, Bullhead City (with the Mohave coal-fired electric generating plant just across the Colorado River), Kingman, Lake Havasu City, Parker, Quartzite, and Yuma.

Sprinkled throughout the AQCR are relatively small mineral-extraction plants associated with mining occupations. These tend to be remote from population centers and productive farmlands. The only fossil-fueled electric generating plants within the AQCR are near Las Vegas (coal, oil and gas) and Yuma (gas).

3.2 METEOROLOGY

The climate of the Clark-Mohave Interstate AQCR ranges from the high-desert condition found over most of Clark and Mohave Counties to the low-desert climate of Yuma County and the narrow strip of land along the Colorado River extending up-river to Lake Mead.

Within the high-desert portion, the climate is very much affected by eleva-

tion. Some of the high mountain peaks (to 11,000 feet in Clark County) reflect an alpine climate, while the lower elevations such as those found in the Las Vegas area (near 2,000 feet) have a climate only slightly less heat-stressful than the low desert near Yuma.

The low-desert climate differs from the high desert in that it is warmer both in summer and winter, with winters being mild enough to allow for a year-round growing season, although occasional frosts are expected during midwinter.

Winds are a characteristic feature of both the high and low deserts, with the strongest blows occurring with the passage of storm systems in late winter and early spring. There are occasional stagnation periods, especially in the fall of the year, which can be conducive to air pollution accumulation.

Stable atmospheric structures that favor pollutant build-ups are not as common in the desert as they are in the southern California coastal regions to the west. However, clear skies at night characteristically allow the formation of surface-based temperature inversions. These conditions may result in the restriction of pollutants released in early morning hours to near-surface elevations until the ground is warmed by the sun and the inversions are destroyed.

The general north-to-south alignment of the Colorado River valley and the elevated terrain features result in a general transport wind carrying pollutants either to the north or the south ends of the AQCR. In some local areas, small-scale wind flows take place, such as those caused by differential heating of mountain and low-land surfaces; these cause a back-and-forth movement of individual air parcels. This effect is suppressed whenever the large-scale pressure features (migrating

lows and highs) dominate the Great Basin area.

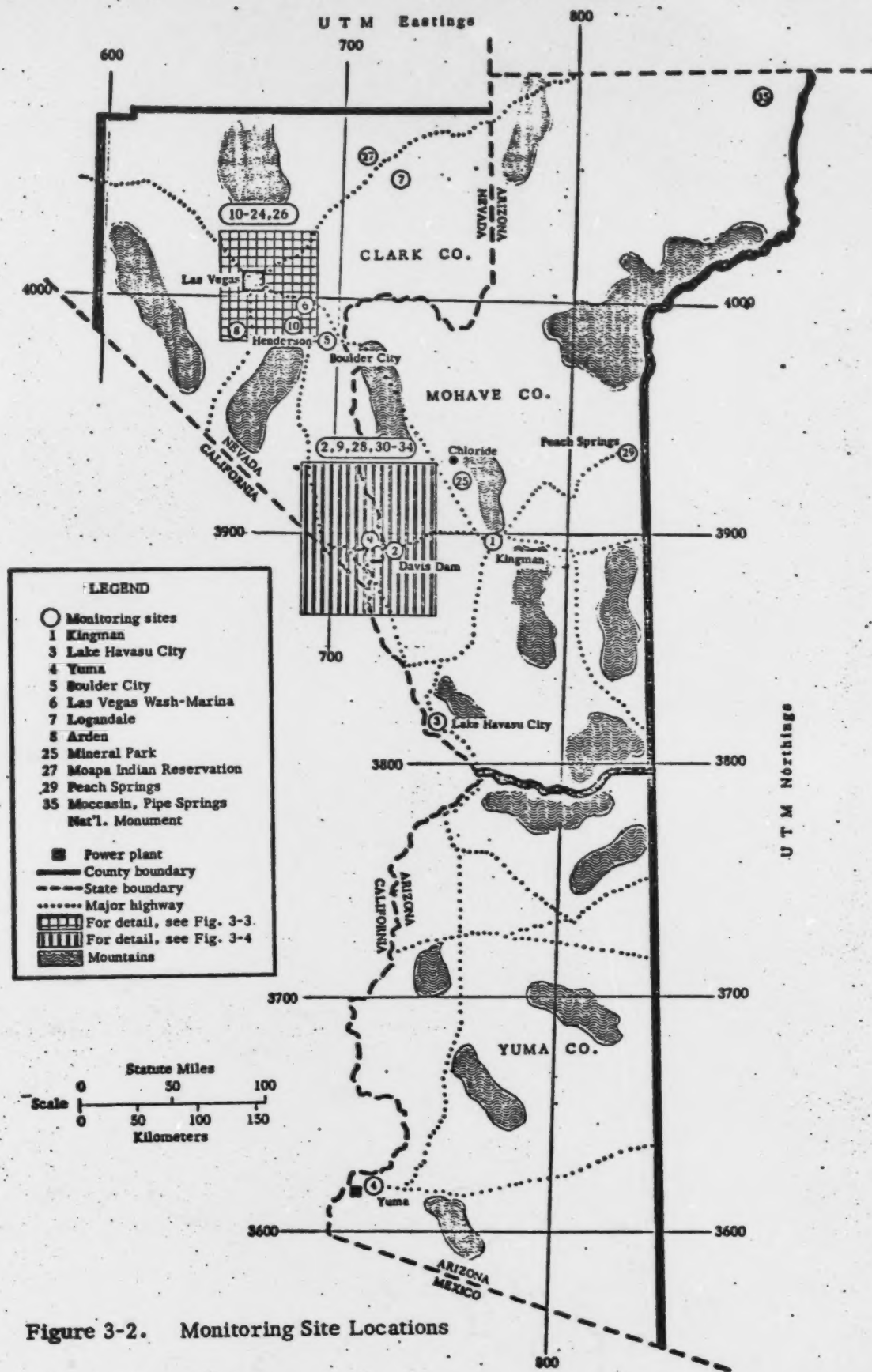
The National Weather Service has data in its files that could be used to prepare wind roses for Las Vegas and Yuma, and will do the required calculations if a special order is placed and a fee of several hundred dollars is paid. For this report, wind roses were not considered essential, but they might be desirable at some future date if new source-receptor problems arise.

3.3 DESCRIPTION OF MONITORING NETWORK

Maps showing the monitoring sites are presented in Figures 3-2, 3-3, and 3-4. Four discontinued sites and one new site are also shown, even though there are no 1974 data corresponding to these locations. Names and brief descriptions of the sites are given on each of the maps and in Table 3-1. Figure 3-4 shows a network of sites that surround the Mohave generating station at Laughlin, Nevada. Most of these stations are operated by the Desert Research Institute under contract to Southern California Edison and probably are not as permanent as the state- or county-operated sites.



Figure 3-1. Clark-Mohave AQCB in relation to EPA Region IX



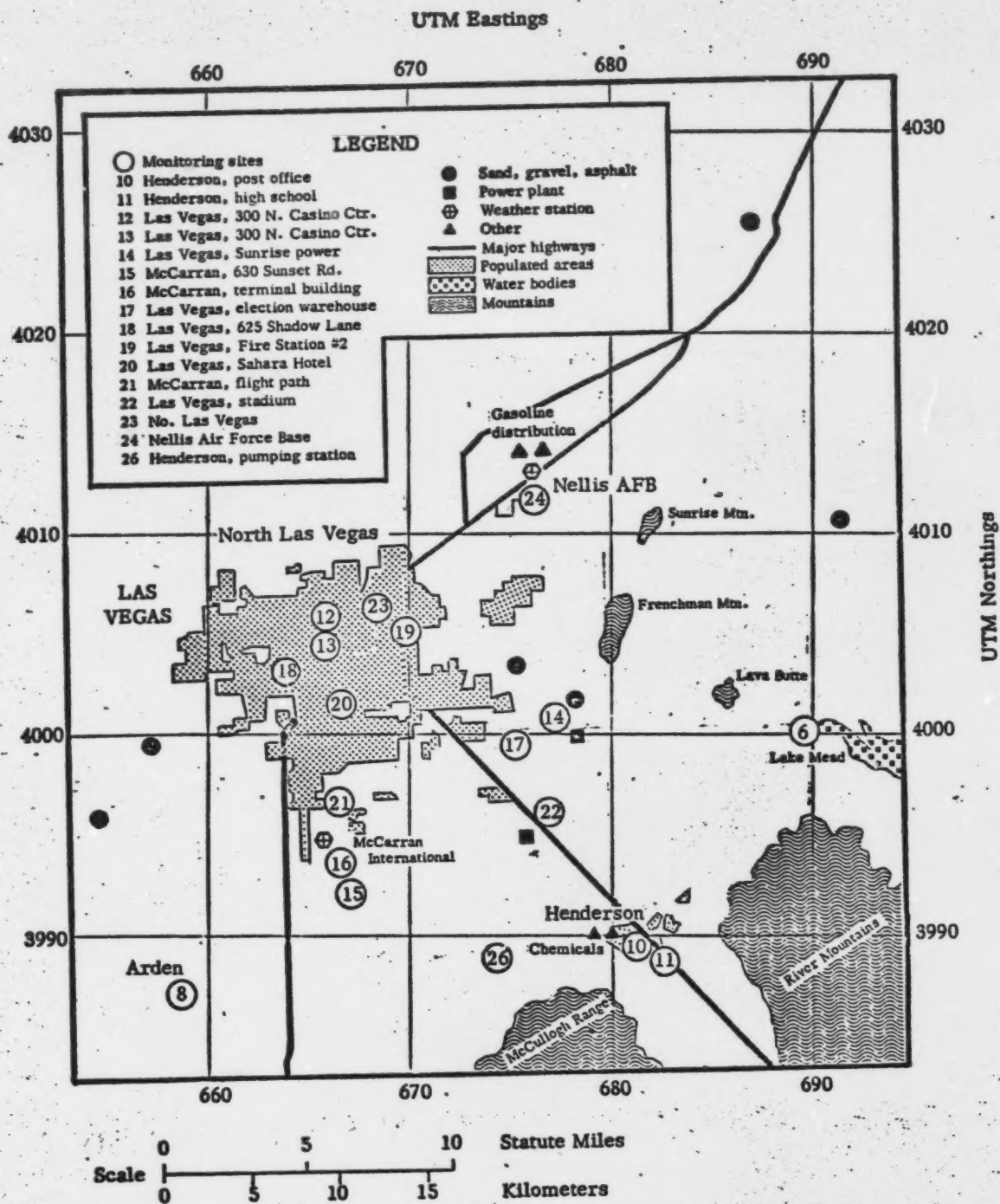


Figure 3-3. Las Vegas Area Monitoring Sites

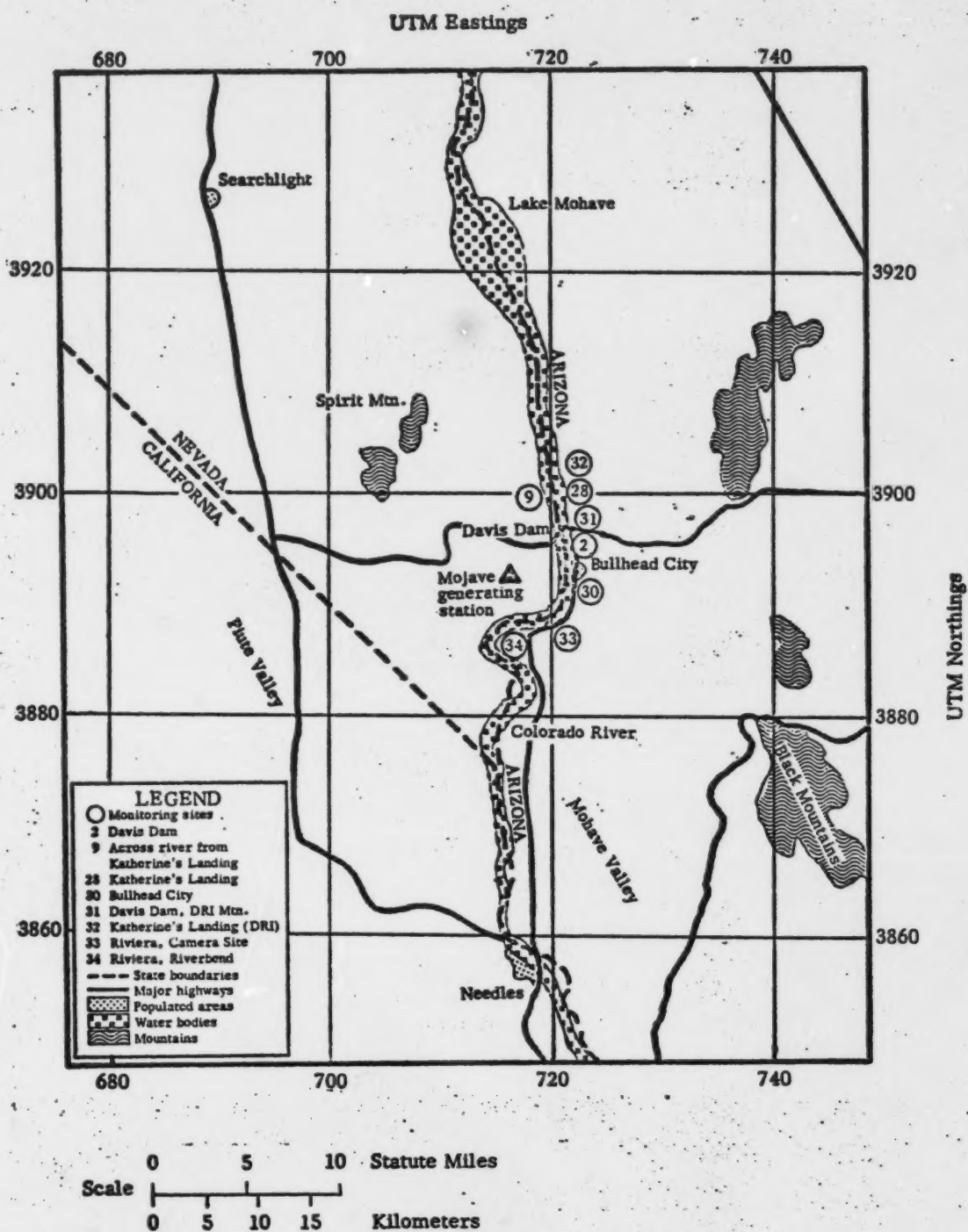


Figure 3-4. Mohave Power Area Monitoring Sites

Table 3-1
Description of Monitoring Sites

No.	Site Location	Site Type	AEROS Code or Private Agency	Pollutants Monitored	Comments
1	Kingman	center city, commercial	030420001	TSP	
2	Davis Dam	rural, industrial	030500006	TSP, SO ₂ , NO ₂	
3	Lake Havasu City	center city, commercial	030500013	TSP	
4	Yuma	center city, commercial	030960002	TSP, Ox	
5	Boulder City	suburban, commercial	290220003	TSP	
6	Las Vegas Wash-Marina	rural	290080011	TSP	
7	Logandale	rural, industrial	290080012	TSP	
8	Arden	rural	290080013	TSP	1-72 thru 5-74
9	Across river from Katherine's Landing	remote	290080018	TSP	
10	Henderson, post office	center city, industrial	290260004	TSP	
11	Henderson, high school	center city, industrial	290260005	TSP	
12	Las Vegas, 300 N. Casino Ctr. (EPA)	center city, commercial	290320001 A01	TSP	
13	Las Vegas, 300 N. Casino Ctr.	center city, commercial	290320001 G01	TSP, CO, NO ₂ , Ox	
14	Las Vegas, Sunrise power	suburban, industrial	290320004	TSP	
15	McCarran, 630 Sunset Rd.	suburban, commercial	290320005	TSP	
16	McCarran terminal building	suburban, mobile	290320007	TSP	
17	Las Vegas, election warehouse	rural, commercial	290320008	TSP	1-72 thru 3-74
18	Las Vegas, 625 Shadow Lane	center city, commercial	290320009	TSP, CO, NO ₂ , Ox	
19	Las Vegas, Fire Station #2	suburban, commercial	290320010	TSP	
20	Las Vegas, Sahara Hotel	center city, commercial	290320011	TSP	
21	McCarran flight path	suburban, commercial	290320012	TSP	
22	Las Vegas stadium	suburban, commercial	290320013	TSP	
23	No. Las Vegas	suburban, commercial	290400001	TSP	
24	Nellis AF Base	suburban, commercial	290400002	TSP	
25	Mineral Park	rural, industrial	030500006	SO ₂	
26	Henderson, pumping station	rural, industrial	290260006	SO ₂	started 1-75
27	Moapa Indian Reservation	rural, agricultural	290080003	TSP	1-72 thru 6-72
28	Katherine's Landing	remote	030500007	TSP, SO ₂	1-72 thru 12-73
29	Peach Springs	remote	UTE	TSP	11-73 thru 2-74
30	Bullhead City	remote, industrial	Des. Res.	TSP, SO ₂ , NO ₂	
31	Davis Dam, DRI Mountain	remote	Des. Res.	TSP, SO ₂ , NO ₂ , Ox	
32	Katherine's Landing	remote	Des. Res.	TSP, SO ₂ , NO ₂	
33	Riviera, Camera Site	remote, industrial	Des. Res.	TSP, SO ₂ , NO ₂	
34	Riviera, Riverbend	remote, industrial	Des. Res.	TSP, SO ₂ , NO ₂	
35	Moccasin, Pipe Springs Nat'l. Mon.	remote	UTE	TSP	7-73 thru 7-74



4. AIR QUALITY SURVEILLANCE AND DATA

Air quality surveillance is carried out in Clark County by the Clark County District Health Department and in Mohave and Yuma Counties by the Arizona State Department of Health. Monitoring is also conducted by the Desert Research Institute, University of Nevada System, and by the Ute Research Laboratories, who sometimes make their data available to the public through the Arizona State Department of Health. Each agency operates independently, and analytical procedures may vary among agencies, so data from different sources may not be strictly comparable.

4.1 AIR QUALITY DATA FOR 1974

Air quality data for 1974 and previous years are summarized in Appendix A in a format designed to assess compliance with standards. Data from AEROS and non-AEROS stations are included, but judgments concerning compliance or non-compliance have been based solely on the data from the AEROS sites since non-AEROS data may be edited and corrected differently.

Particulate Standards

Annual geometric mean particulate levels for all sites are shown in Figure 4-1 along with the second highest 24-hour value for each site. It should be noted that data from 14 of the 24 AEROS sites do not meet the criteria for a valid year and therefore cannot be judged for compliance with the annual standard. In most cases data were completely absent for the third quarter of 1974. Approximate

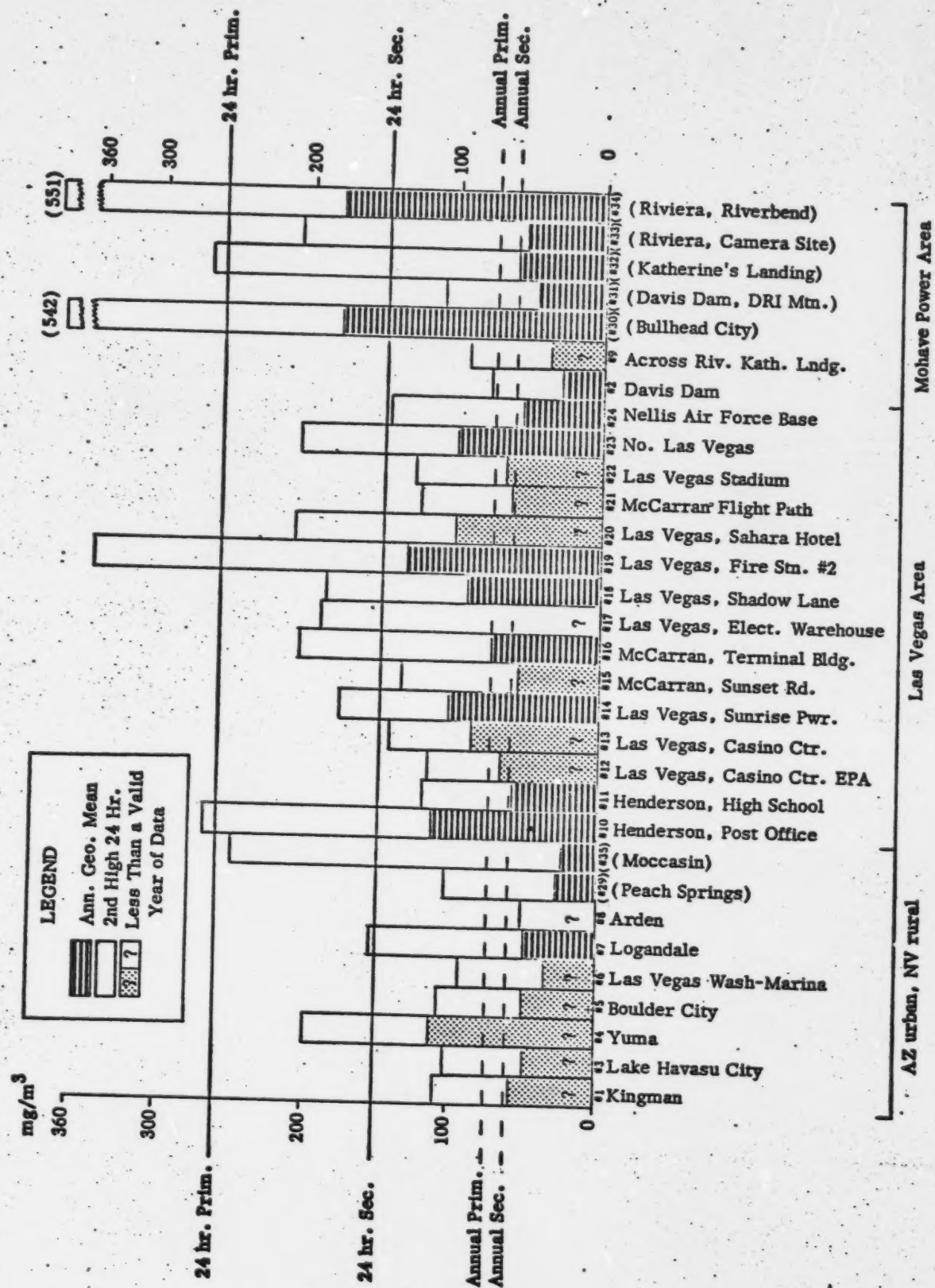


Figure 4-1. Suspended Particulate Levels

annual means were calculated from data for three quarters, and these values are labeled with question marks in Figure 4-1. The second highest 24-hour values may be too low for these same stations, since high values could have occurred during the missing quarters. The magnitude of errors from this cause cannot be estimated.

The annual primary standard is exceeded at five of the AEROS sites and probably at three more sites with incomplete data. All but one of these (Yuma) are in the Las Vegas area. The annual secondary guideline is exceeded at one additional Las Vegas site and probably at three others with incomplete data. The other two Las Vegas sites are very slightly below the secondary guideline. The Arizona sites (except Yuma) and the rural and remote Nevada sites are all in compliance with the annual secondary guideline.

The 24-hour primary standard is exceeded at Las Vegas, Fire Station #2, and at the Henderson post office, but not at other nearby sites. This suggests that local particulate sources, rather than widespread area sources, are responsible for these values. The 24-hour secondary guideline is exceeded at seven of the Las Vegas sites and could be exceeded at five more sites where the data are incomplete. The 24-hour secondary guideline is met at three sites for which data are complete: Henderson High School, Nellis Air Force Base, and Davis Dam. Incomplete data suggest that Arizona sites (except Yuma) and the rural and remote Nevada sites are all in compliance with the 24-hour secondary guideline. Data from the private sites near the Mohave power station range from well below secondary guidelines to greatly above primary standards. Since all these stations are close to one an-

other, this suggests that particulate sources in the immediate vicinity of certain sites are responsible for the very high values.

Sulfur Dioxide Standards

Sulfur dioxide is monitored at Mineral Park, Arizona and in the area near the Mohave power station. Annual average values and second highest 24-hour values for each site are shown in Figure 4-2. All values are so low that they are near the detection limits of the measuring instruments, and all standards are met by a wide margin.

Nitrogen Dioxide Standards

Nitrogen dioxide is measured in the center city of Las Vegas and in the area near the Mohave power station. Annual average values for each site are given in Figure 4-2. Although the data for the Las Vegas sites do not make up a valid year, there is a strong indication that the standard is met. The sites in the Mohave power area meet the standard by a wide margin.

Carbon Monoxide Standards

The two carbon monoxide monitors in the AQCR are both located in the Las Vegas center city. The second highest one-hour and eight-hour values are shown in Figure 4-2. The one-hour standard is met at both sites but by a very narrow margin at the Casino Center site. The eight-hour standard is exceeded at both sites, and the second highest eight-hour values are almost identical at each site. Since carbon monoxide is closely associated with automobile traffic, the values at these sites depend primarily on traffic patterns in central Las Vegas.

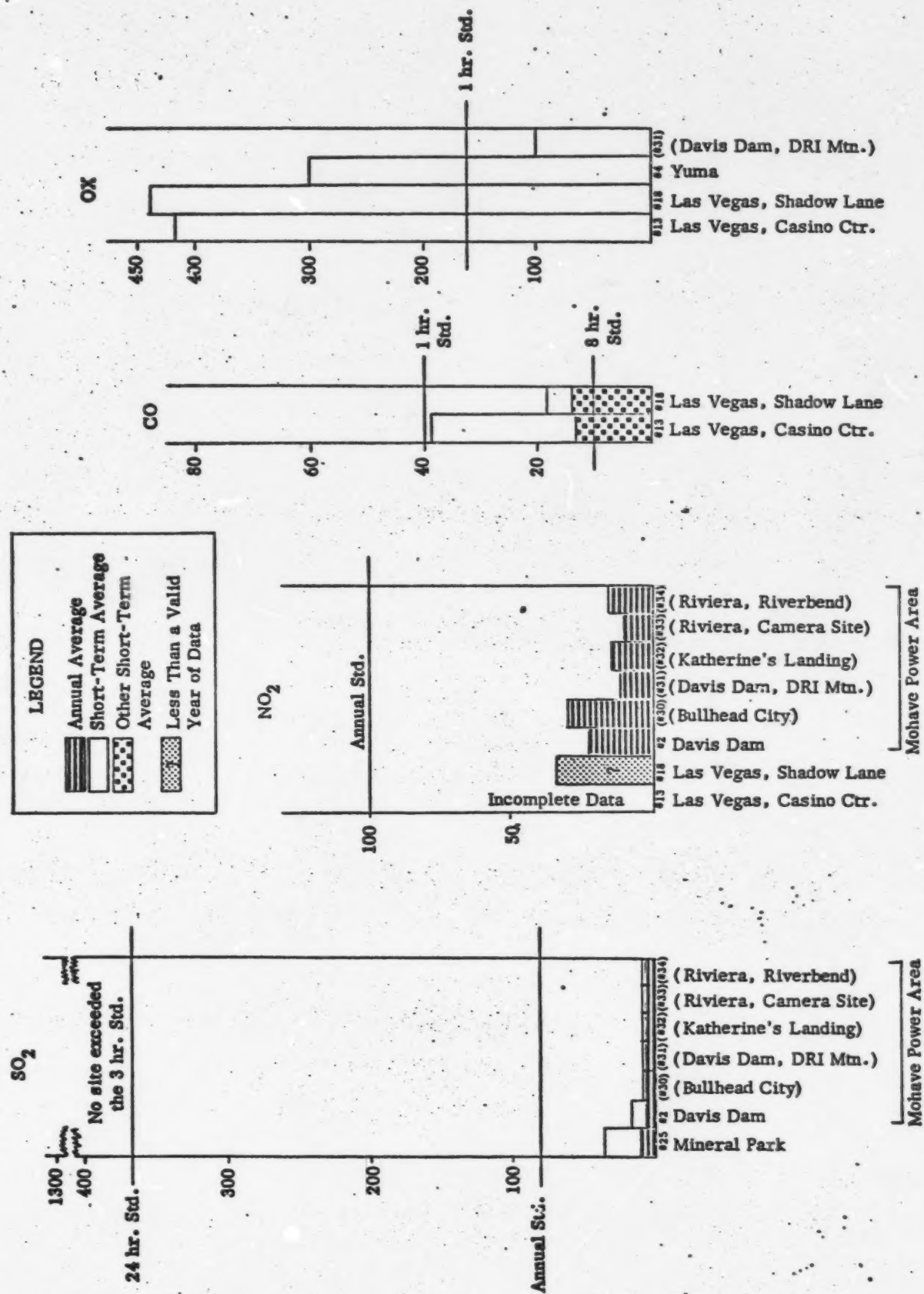


Figure 4-2. Pollutant Levels

Oxidant/Ozone Standards

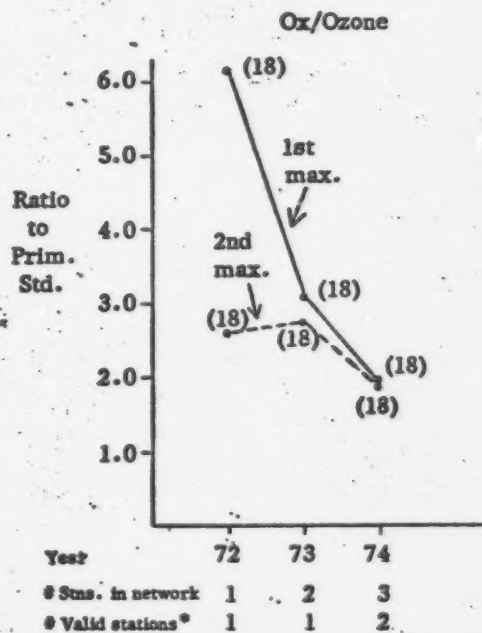
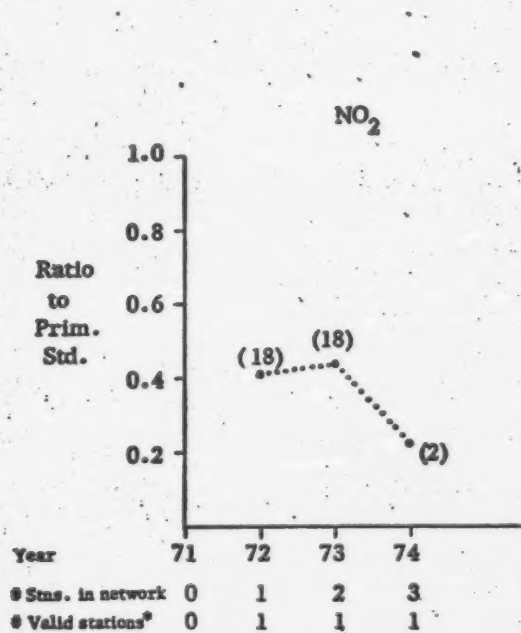
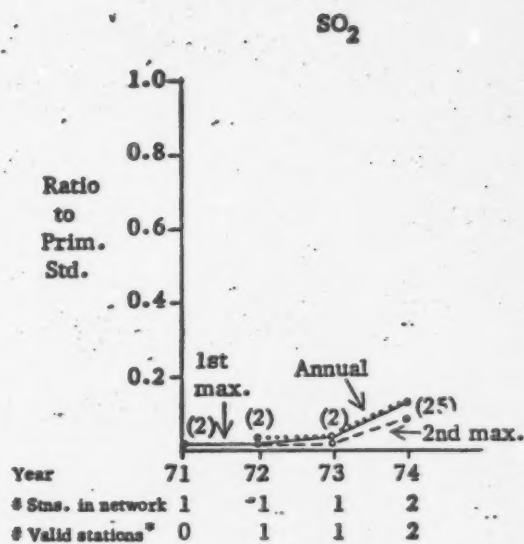
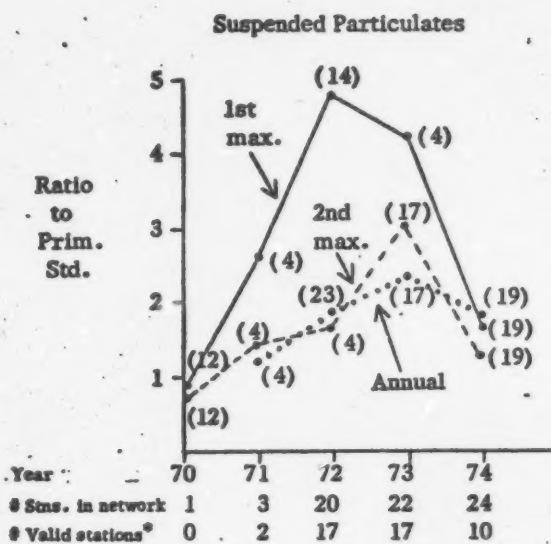
Oxidant is measured at two center-city sites in Las Vegas, in Yuma, and at Davis Dam (non-AEROS station). As indicated in Figure 4-2, the one-hour standard is exceeded at all sites except Davis Dam. There were 189 (of 3,572) values exceeding the standard at Las Vegas-Shadow Lane, 40 (of 6,653) at Las Vegas-Casino Center, and some unknown number (less than 243 of 6,858) at Yuma because the Yuma data were apparently received by the NADB too late for the calculations to be made. The second highest hourly values at Las Vegas were approximately two and two-thirds times the standard, and in Yuma the second highest value was one and seven-eighths times the standards.

4.2 TRENDS IN AIR QUALITY SINCE 1970

Air quality data for 1970-1973 are summarized in Appendix A along with the data for 1974. The data from AEROS sites were used to prepare the plots shown in Figure 4-3, which gives the highest levels for each pollutant for each year for the entire AQCR. Values are presented as the ratio of the quantity to the primary air quality standard.

Particulate Trends in the AQCR

Particulate data are available from 1970-1974 and are plotted in Figure 4-3. At first glance there might appear to be a marked increase between 1970-1973 and a drop in 1974; however, it should be noted that the monitoring network was expanded greatly in 1972 and was still changing in 1973 and 1974. An examination of the stations reporting the highest values for each year shows the following:



*Validity is defined by NADB in each annual "Trends Report." A station is invalid when so much data is missing that the record is not representative of the whole year.

Figure 4-3. Pollutant Trends in the AQCR as a Whole

- 1970 Station #12 was the only one in operation, and it operated for less than a full year.
- 1971 Station #4 (highest in all categories) was reporting for the first time.
- 1972 Station #14 (highest 1st. max.) and Station #23 (highest annual average) were reporting for the first time in 1972.
- 1973 All of the stations that had high values for previous years were still reporting, but Station #17 (highest 2nd max. and highest annual average) was in its first year as a valid site.
- 1974 Station #19 (highest values in all categories) was in its first year as a valid site. Station #17 (high in 1973) was discontinued halfway through the year. Station #4 (high in previous years) did not meet the criteria for a valid year.

Trends in the AQCR as a whole can be identified only when the monitoring network remains constant over the whole time period. The addition of a new monitoring station that records higher levels than the older stations does not indicate an upward trend throughout the AQCR; in fact, a downward trend may even be occurring. Until the monitoring network is stabilized, trends should be examined on a site-by-site basis.

Other Trends in the AQCR

The data base for SO₂, NO₂, CO, and Ox is much more limited than the particulate data base. Trend plots for SO₂, NO₂, and Ox are given in Figure 4-3 but no plot was made for CO because 1974 is the only year for which data are available. Sulfur dioxide levels are so low that they are near the limit of detectability. A slight upward trend is shown for 1974, but this was caused by the addition of a second station to the monitoring network which reports values that are still very low, but higher than the other station. The nitrogen dioxide trend

plot shows a decrease between 1973 and 1974; however, the plot is difficult to interpret because only one station recorded enough data to be categorized as valid for each year. The single valid station for 1974 was not the same as the single valid station for 1972 and 1973. More data must be accumulated before this trend can be confirmed. The ozone/oxidant trend plot is essentially a record of the trend at a single monitoring site since the second station that was added in 1973 recorded lower values than the original station. At Station #18 in 1972 the highest hourly value was 6.2 times the standard, while the second highest hourly value was 2.6 times the standard. In 1973 and 1974 the first and second highest values were much closer to each other. One suspects that if the 1974 editing routines were applied to the 1972 data, the highest value might be deleted for falling too far outside the normal range of variability. The plot of second highest values is probably more reliable for trend detection, and this shows that oxidant decreased in 1974 compared to 1972 and 1973 but was still almost twice the standard value.

Mathematical Analysis of Trends

A formal trend analysis, on a site-by-site basis, was done for each site that provided data for 12 or more consecutive quarters. The results of this analysis are summarized in Table 4-1, and more details are given in Appendix B. Sufficient data on suspended particulates were available for nine sites, and data on sulfur dioxide were available for one site. No sites had sufficient data on carbon monoxide, nitrogen dioxide, or oxidant/ozone. Because data are available for a very short time span (three or four years), pollutant levels for each quarter of the year are analyzed to have sufficient observations for a statistical treatment. The data were

first examined for regular seasonal variations. Stable variations were found at the following sites:

- # 2 Davis Dam (particulates only)
- # 7 Logandale
- #10 Henderson, post office
- #11 Henderson, high school
- #24 Nellis AF Base

No stable seasonal variations were found at the following sites:

- #14 Las Vegas, Sunrise power
- #16 McCarran terminal
- #18 Las Vegas, Shadow Lane
- #23 North Las Vegas
- # 2 Davis Dam (SO₂ only)

This might indicate that weather conditions, which exhibit stable seasonal variations, are of primary importance in determining particulate levels at the small town, rural, or remote sites; but other factors which are associated with non-seasonal, human activity are of primary importance in determining particulate levels in center-city sites in heavily populated areas. The lack of stable seasonal variation in SO₂ levels at Davis Dam is probably due to the fact that many of the observations are at the lower limit of detectability by the monitoring instrument, and variations about these low levels would be undetectable. Data were adjusted to remove any stable seasonal variations before carrying out the trend analysis.

Trends were evaluated by fitting a linear regression line to the data (with seasonal and irregular variations removed, if appropriate) and determining whether the slope of the curve was significantly different from zero. Significant downward trends were found for the quarterly geometric mean particulate level at North Las Vegas (#23) and Nellis AF Base (#24) and for the second highest 24-hour particulate

values at North Las Vegas (#23), Nellis AF Base (#24), and at Henderson high school (#11). A closer examination of these data showed that exceptionally high values were measured in the first quarter of 1972 --the first quarter that all of these sites were in operation. When the trend analysis was repeated, beginning with the second quarter of 1972, no significant trend was found. There is, therefore, no evidence of a continuing trend in particulate levels at any site. There is a significant upward trend in sulfur dioxide levels at Davis Dam, which may be real or may be due to recent improvements in measurement techniques. This trend amounts to an increase in the average value of about $0.6 \mu\text{g}/\text{m}^3$ during each quarter. Since present levels are around $8 \mu\text{g}/\text{m}^3$ for the annual average, this rate of increase could continue for 30 years before the standard was reached. In spite of this, the trend should be re-evaluated periodically to determine whether it is real and continuing, and to identify the reasons for the trend.



5. GROWTH PATTERNS

This section of the report summarizes changes in human activity within the AQCR that may have affected air quality in the recent past. It also includes predictions of future growth patterns that may be helpful in estimating future air quality.

5.1 POPULATION AND GENERAL GROWTH

Population changes for the counties within the AQCR are summarized in Table 5-1 below and plotted in Figure 5-1. Predictions of future populations are also included.

Table 5-1

		Population Estimates			
		Clark Co. Nevada	Mohave Co. Arizona	Yuma Co. Arizona	Entire AQCR
April	1970	273,288	25,857	60,827	359,972
July	1971	286,700	28,100	63,600	378,400
July	1972	298,000	30,100	64,900	393,000
July	1973	307,700	33,500	66,500	407,700
July	1974	321,800	35,300	67,800	422,700
July	1980	404,500	45,000	80,000	529,500
July	1985	459,500	50,600	89,100	599,200
July	1990	519,300	55,600	96,100	671,000

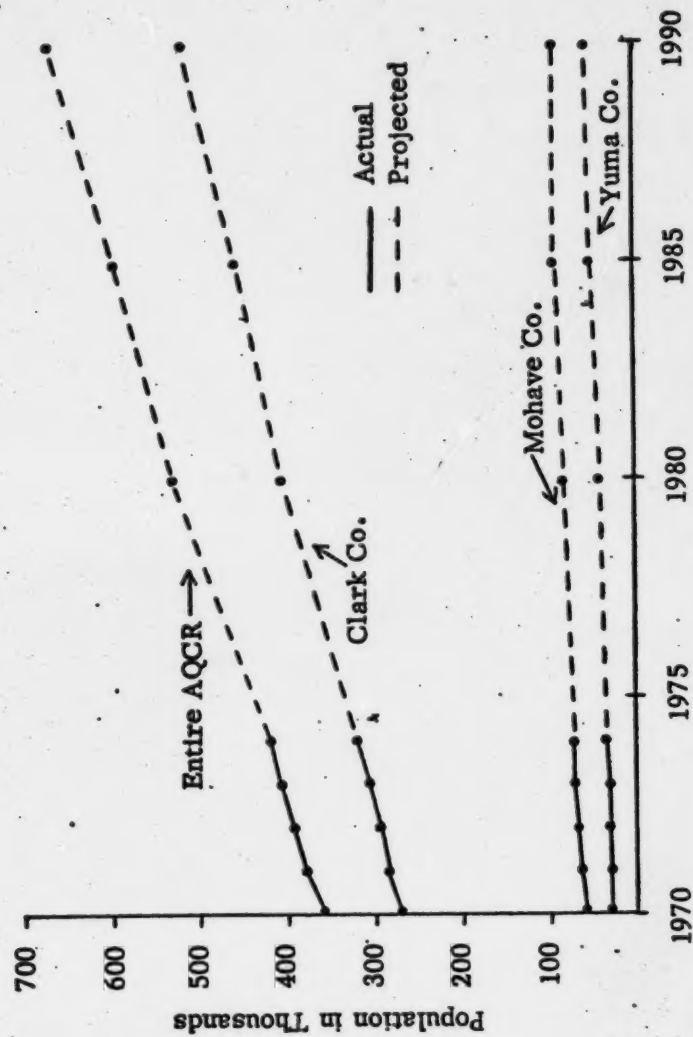


Figure 5-1. Population Trends

In absolute numbers, by far the greatest growth has occurred in Clark County.

It may be helpful to know which geographical areas within the counties were growing most rapidly. Sub-county population figures are not available, but building permit data on new housing units can be used to apportion county population growth. These figures are tabulated below.

Table 5-2

New Privately Owned Housing Units Authorized in Permit-Issuing Places

	1970	1971	1972	1973	1974
Clark County					
Boulder City	9	140	163	195	21
Henderson	314	217	210	128	157
Las Vegas	1638	1847	2201	1213	834
North Las Vegas	1416	1249	382	97	53
Unincorporated	2898	4409	8050	6810	2680
Mohave County					
Kingman	28	NA	26	28	50
Lake Havasu	NA	NA	NA	NA	NA
Unincorporated	729	640	778	675	668
Yuma County*					
Parker Town	23	450	59	31	26
Somerton	NA	NA	54	15	6
Yuma	278	341	353	194	191
Unincorporated	NA	NA	306	282	286

*Part of county is not covered by building permit system

The data suggest that most of the population growth within the AQCR has occurred in the Las Vegas area and in the unincorporated portions of Clark County (probably near Las Vegas). The populations of Boulder City, Henderson, Kingman, Parker Town, and Somerton may be assumed to be stable.

5.2 EMISSION SOURCES

At the present time the NEDS emissions data base is the only one available, and it is not sufficiently refined to give a reliable inventory of emissions and historical records of important changes. This situation is expected to improve, so for general interest and possible future value, the NEDS emissions reports -- by county -- are included in Appendix C. As a first approximation, trends in mobile source emissions and other area source emissions may be assumed to follow the trends in population growth. Extensive comments are not appropriate, but it is evident that the highest proportion of emissions in the AQCR originate from Clark County which also has the highest population.



6. DISCUSSION OF TRENDS

6.1 SUMMARY OF OBSERVED TRENDS

No continuing trends were observed in any measurements of suspended particulate matter. A slight upward trend in sulfur dioxide levels at Davis Dam began in the second quarter of 1974. This section of the report summarizes trends and irregular variations in weather conditions and source emissions, and attempts to relate these to observed trends (or absence of trends) in air quality.

6.2 WEATHER CONDITIONS SINCE 1970

Accumulation of pollutants occurs when the air is "stagnant" or actually when air is moving about in a more sluggish manner than normal. If some simple way could be found to measure the degree of "stagnation," this quantity could be used as an index to characterize weather conditions in relation to their influence on pollution. The presence of stagnation (subsidence) is noted in several ways: the winds at the surface tend to be weak, the skies tend to be free of clouds, and the temperature of the air is warmer than normal. Due to local heating and turbulence effects near the earth's surface, the amount of subsidence cannot be gauged through surface meteorological reports. However, the temperature at the 850 millibar level, which is approximately 5,000 feet above mean sea level, can be used as an indicator of the air mass stability. Higher than normal temperatures indicate that the air is more stagnant than normal and favors high levels of pollu-

tion. Colder than normal temperatures indicate better than normal dispersion conditions.

The Clark-Mohave Interstate AQCR has two upper-air stations either within or near its borders, so that two temperature aloft measurements can be obtained and applied to the Region's air quality data. The site at Yucca Flat, Nevada, provides the necessary information for the Clark County part of the Region, while the upper-air observation station at Yuma, Arizona, may be used for the air quality monitors located in the southern part of the Region. Temperature-sounding data from both locations were collected and summarized back through 1966. The Yucca Flat record was complete through 1974, but that of Yuma was incomplete according to the records at the National Weather Forecast office in Los Angeles. Since only air monitoring data in the Clark County area are of sufficient amount for any kind of trend analysis, only the Yucca Flat upper-air data were used in the study of the weather conditions over the sampling period.

Table 6-1 summarizes the relevant data. The five-year period 1966-1970 was used to provide sufficient data from which average temperatures could be derived. Seasonal averages were obtained to make it possible to detect weather and pollutant changes occurring in a less-than-a-year time frame. The years of 1971 through 1974 were also summarized in terms of seasonal temperatures at 5,000 feet. In addition, each season was compared with the five-year seasonal means previously obtained, and the departures from the mean temperature were noted.

Inspection of Table 6-1 shows that the expected seasonal variations in upper-air temperatures occurred, but no trend was present between 1970 and 1974.

Dispersion was better than normal in the fourth quarters of 1971 and 1972 and the first quarter of 1973. The air mass was more stagnant than normal in the first quarter of 1972 and slightly more stagnant in the second quarters of 1972, 1973, and 1974. Table 6-2 shows the departure from the seasonal norms for the geometric mean particulate values for each quarter (for the five sites showing stable seasonal variations).

Table 6-1

Temperatures at 850 mb (5000 Feet)
Yucca Flat, Nevada
(°C)

Year	First Quarter		Second Quarter		Third Quarter		Fourth Quarter	
	Ave.	Dep.*	Ave.	Dep.*	Ave.	Dep.*	Ave.	Dep.*
1966-1970	4.6	--	14.2	--	22.0	--	8.0	--
1971	2.8	-1.8	13.7	-0.5	22.4	+0.4	5.6	-2.4
1972	7.2	+2.6	15.7	+1.5	22.3	+0.3	5.7	-2.3
1973	2.4	-2.2	15.4	+1.2	22.2	+0.2	8.2	+0.2
1974	4.2	-0.4	16.1	+1.9	22.6	+0.6	8.0	+0.0

*Departure from previous 5-year mean.

Table 6-2

Variations from Normal Seasonal Particulate Patterns

Year	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1972	+10%	-15%	-7%	+5%
1973	- 5%	- 7%	none	+4%
1974	-11%	+13%	-5%	-8%

It is evident that there is no one-to-one correspondence between the quarters having abnormal weather and those having unusual particulate values. Perhaps the relationship would be improved if the meteorological conditions were examined for only those days when the particulate sampling was done. Unfortunately the standard AEROS reports available at the time of this writing do not list the dates of each particulate sample, so this analysis was not feasible.

6.3 TRENDS IN EMISSIONS

As discussed earlier, there is no really adequate documentation of trends in emissions -- particularly from stationary sources. One would expect emissions from automobiles and other area sources to increase in proportion to the population increase. However, during the period between 1970 and 1975 the emissions per vehicle have decreased as more and more cars were equipped with controls. The controls for carbon monoxide were more than sufficient to compensate for the increase in vehicle population even in Las Vegas, and a decrease in carbon monoxide emissions occurred throughout the period. Nitrogen oxides controls on automobiles were implemented in 1973, so emissions in most areas increased slightly in 1970, 1971, and 1972, began to fall in 1973, and continued to fall thereafter.

Emissions from power plants located near Las Vegas and Yuma probably paralleled the population growth in these areas. The emissions in the Las Vegas area are chiefly nitrogen oxides and sulfur dioxide along with some particulates, and they have probably increased somewhat during the 1970-1975 period. The Yuma plant is natural gas fueled and therefore emits primarily nitrogen oxides. Since

there has been little growth in the Yuma area, the emissions have probably remained relatively constant. The power plant at Laughlin, Nevada is large, coal fired, and supplies power chiefly to southern California. This plant is new (fall of 1970) and has operated fairly steadily since mid-1971 with occasional changes for testing various control devices. The major emissions are nitrogen oxides and sulfur dioxide along with some particulates that escape from the control devices. The greatest increase in emissions occurred in 1970 and 1971 when the plant was first started up, and since then emissions have been relatively constant.

Emissions from concrete and asphalt plants consist primarily of large-size particulate matter that falls out within a short distance from the plant. Thus, these emissions would influence only those monitoring sites located very close to the plants. Only one site in the AQCR meets this criterion -- the station at the Sunrise power plant in Las Vegas, which is also about two kilometers from the Ideal Asphalt plant. No historical data are available on plant activities, so it is impossible to evaluate its influence on particulate levels measured at the Las Vegas, Sunrise power monitoring station.

6.4 CONCLUSIONS

It is not surprising that no consistent trends in suspended particulate levels were found within the AQCR, since all evidence indicates that sources in the immediate vicinity of the monitoring site may strongly influence the measurements. Seasonal weather patterns influenced the particulate levels strongly at rural and remote sites but not at center-city sites; however, short excursions from normal weather conditions did not necessarily produce abnormal particulate readings --

possibly because sampling was usually done on every sixth day.

The apparent increasing trend in SO_2 levels at Davis Dam occurred suddenly in 1974 at a point in time where no sudden changes were made in the nearby Mohave power plant. The readings at the site should be watched carefully in the future to see whether it is the SO_2 levels or the measurement techniques that have changed.

Trends in oxidant/ozone, nitrogen dioxide, and carbon monoxide could not be evaluated because insufficient data are available.



APPENDICES



APPENDIX A
AIR QUALITY DATA

Suspended Particulate Data

Site #	Site Location	Year	No. of Valid Values	No. Daily Values Exceeding 24-hr. stds.		Highest 24-hr. Values $\mu\text{g}/\text{m}^3$		Annual Geom. Mean
				Prim.	Sec.	1st	2nd	
1	Kingman center city, commercial	1973	7			110	64	--
		1974	45	0	0	116	110	597
2	Davis Dam rural, industrial	1971	51	0	2	219	182	33
		1972	57	0	0	148	136	36
		1973	61	0	0	141	112	32
		1974	56	0	0	87	77	28
3	Lake Havasu City center city, commercial	1973	5	0	0	138	109	--
		1974	31	0	0	103	102	467
4	Yuma center city, commercial	1971	45	4	10	673	375	94
		1972	56	3	11	447	438	98
		1973	59	3	15	1,101	287	109
		1974	45	0	5	211	199	1117
5	Boulder City suburban, commercial	1972	49	1	3	262	215	61
		1973	56	0	0	139	123	49
		1974	37	0	0	124	107	527
6	Las Vegas Wash - marina rural	1972	51	1	2	354	187	35
		1973	53	0	1	197	103	36
		1974	27	0	0	96	92	357
7	Logandale rural, industrial	1972	54	0	2	216	171	42
		1973	41	0	3	186	167	40
		1974	44	0	2	165	152	47
8	Arden rural	1972	35	1	1	309	146	45
		1973	41	0	0	99	77	35
		1974	14	0	0	61	51	--
9	Across river from Katherine's Landing - remote	1974	20	0	0	95	92	387
10	Henderson, post office center city, industrial	1972	50	2	10	805	267	1027
		1973	53	1	11	285	248	105
		1974	47	2	10	426	267	114
11	Henderson, high school center city, industrial	1972	49	1	6	345	204	69
		1973	53	0	0	143	132	62
12	Las Vegas, 300 N. Casino Ctr. center city, commercial (EPA)	1970	19	0	5	238	204	--
		1971	21	1	2	285	160	--
		1972	15	0	0	138	112	--
		1973	8	0	0	124	101	--
		1974	18	0	0	120	117	697
13	Las Vegas, 300 N. Casino Ctr. center city, commercial	1972	48	1	7	811	209	98
		1973	45	0	0	149	147	85
		1974	44	0	1	161	143	877

Suspended Particulate Data (cont'd)

Site #	Site Location	Year	No. of Valid Values	No. Daily Values Exceeding 24-hr. stds.		Highest 24-hr. Values $\mu\text{g}/\text{m}^3$		Annual Geom. Mean
				Prim.	Sec.	1st	2nd	
14	Las Vegas, Sunrise power suburban, industrial	1972	53	1	11	1,243	195	100
		1973	55	2	11	412	296	99
		1974	45	1	7	265	177	105
15	McCarran, 630 Sunset Rd. suburban, commercial	1972	37	1	2	1,182	170	57
		1973	51	0	1	151	150	47
		1974	24	0	0	139	137	56?
16	McCarran, terminal bldg. suburban, mobile	1972	52	1	2	912	151	62
		1973	53	1	1	297	142	61
		1974	53	0	2	223	206	74
17	Las Vegas, election warehouse rural, commercial	1972	36	7	20	367	343	--
		1973	49	14	27	850	792	177
		1974	6	1	2	332	192	--
18	Las Vegas, 625 Shadow Lane center city, commercial	1972	49	0	2	195	152	88
		1973	52	1	4	367	162	78
		1974	49	0	7	225	187	92
19	Las Vegas, Fire Sta. #2 suburban, commercial	1973	43	1	6	276	215	--
		1974	51	4	24	427	345	134
20	Las Vegas, Sahara Hotel center city, commercial	1972	50	2	6	978	412	100
		1973	38	2	7	419	273	--
		1974	50	1	4	262	212	100?
21	McCarran flight path suburban, commercial	1974	15	0	1	157	124	61?
22	Las Vegas stadium suburban, commercial	1974	20	0	1	192	128	67?
23	No. Las Vegas suburban, commercial	1972	56	2	18	727	261	140
		1973	40	0	3	213	182	99
		1974	44	0	6	209	205	99
24	Nellis Air Force Base suburban, commercial	1972	47	1	5	1,216	227	81
		1973	50	0	3	188	177	58
		1974	43	0	1	250	147	56
27	Moapa Indian Reservation rural, agricultural	1972 ^a	25	0	2	214	171	--

^a 1-1972 through 6-1972

Suspended Particulate Data (cont'd)

Site #	Site Location	Year	No. of Valid Values	No. Daily Values Exceeding 24-hr. stds.		Highest 24-hr. Values $\mu\text{g}/\text{m}^3$		Annual Geom. Mean
				Prim.	Sec.	1st	2nd	
28	Katherine's Landing remote	1952	50	0	2	188	162	47
		1973	38	0	0	80	78	34
29	Peach Springs remote	1974 ^b	48	(1)	(1)	(444)	(103)	(27)
30	Bullhead City remote, industrial	1974	54	NA	NA	(983)	(542)	(180)
31	Davis Dam, DRI Mountain remote	1974	50	(1)	(1)	(289)	(109)	(44)
32	Katherine's Landing remote	1974	46	NA	NA	(713)	(269)	(60)
33	Riviera, Camera Site remote, industrial	1974	56	(1)	NA	(263)	(207)	(54)
34	Riviera, Riverbend remote, industrial	1974	55	(1)	NA	(598)	(551)	(180)
35	Moccasin, Pipe Springs National Monument remote	1974 ^c	147	(0)	NA	(253)	(252)	(23)

^b 11-1973 through 2-1974

^c 7-1973 through 7-1974

() indicates data from non-AEROS sites

? indicates less than a valid year

Oxidant and Ozone Data

Site #	Site Location	Year	No. Valid Values	No. Values Exceeding 1 hr. std.	Highest 1 hr. Values $\mu\text{g}/\text{m}^3$	
					1st	2nd
13	Las Vegas, 300 N. Casino Ctr. center city, commercial	1973	1,196	NA	163	NA
		1974	6,653	40	216	201
18	Las Vegas, 625 Shadow Lane center city, commercial	1972	6,436	NA	999	415
		1973	7,711	799	504	438
		1974	3,572	189	316	310
4	Yuma center city, commercial	1974	6,698	NA	275	265
31	Davis Dam, DRI Mountain remote	1974	8,631	0	(100)	(100)

() indicates data from non-AEROS sites

Nitrogen Dioxide Data

Site #	Site Location	Year	No. Valid Values	Highest 24-hr. Values $\mu\text{g}/\text{m}^3$	Annual Arith. Mean
2	Davis Dam rural, industrial	1973	14	50	--
		1974	55	69	22
13	Las Vegas, 300 N. Casino Ctr. center city, commercial	1974	2,504	177	--
18	Las Vegas, 625 Shadow Lane	1972	7,195	386	41
		1973	7,329	286	44
		1974	6,157	287	347
30	Bullhead City remote, industrial	1974	55	(77)	(29)
31	Davis Dam, DRI Mountain remote	1974	55	(19)	(11)
32	Katherine's Landing remote	1974	56	(26)	(14)
33	Riviera, Camera Site remote, industrial	1974	58	(21)	(10)
34	Riviera, Riverbend remote, industrial	1974	57	(34)	(15)

() indicates data from non-AEROS sites
 ? indicates less than a valid year

Sulfur Dioxide Data

Site #	Site Location	Year	No. Valid Values	No. Daily Values Exceeding 24-hr. Standard	Highest 24-hr. Values $\mu\text{g}/\text{m}^3$		No. Values Exceeding 3-hr. std.	Annual Arith. Mean
					1st	2nd		
2	Davis Dam rural, industrial	1971	17	0	3	3	0	--
		1972	57	0	3	3	0	3
		1973	58	0	10	3	0	3
		1974	55	0	17	16	0	6
25	Mineral Park rural, industrial	1974	55	0	47	34	0	11
28	Katherine's Landing remote	1972	40	0	3	3	0	--
30	Bullhead City remote, industrial	1974	56	0	(<13)	(<13)	0	(<13)
31	Davis Dam, DRI Mountain remote	1974	55	0	(<13)	(<13)	0	(<13)
32	Katherine's Landing remote	1974	56	0	(<13)	(<13)	0	(<13)
33	Riviera Camera Site remote, industrial	1974	57	0	(<13)	(<13)	0	(<13)
34	Riviera, Riverbend remote, industrial	1974	57	0	(<13)	(<13)	0	(<13)

() indicates data from non-AEROS sites

Carbon Monoxide Data

Site #	Site Location	Year	No. Valid Values	No. Values Exceeding Standards		Highest 1-hr. Values mg/m^3		Highest 8-hr. Values mg/m^3		Annual Arith. Mean
				1 hr.	8 hrs.	1st	2nd	1st	2nd	
13	Las Vegas, 300 N. Casino Ctr. center city, commercial	1973	1,363	0	NA	40	NA	NA	NA	--
		1974	7,448	1	72	57	38	16.3	13.1	2.5
18	Las Vegas, 625 Shadow Lane	1974	966	0	16	19	18	16.0	13.3	--



APPENDIX B
TREND CALCULATIONS

TSP MEAN DAVIS DAM

TSP MEAN DAVIS DAM						PAGE 1, SERIES
0 1. ORIGINAL SERIES	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
1971	256.	428.	468.	227.	1379.	
1972	270.	405.	683.	256.	1614.	
1973	188.	378.	544.	288.	1398.	
1974	168.	416.	436.	266.	1286.	
1975	323.	*****	*****	*****	323.	
AVE	241.	406.	533.	259.		
TABLE TOTAL	6000.	MEAN	353.	STD. DEVIATION	132.	

TSP MEAN DAVIS DAM						PAGE 4, SERIES
0 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVE	
1971	63.1	115.3	148.6	66.9	98.5	
1972	69.3	98.1	167.9	59.9	101.3	
1973	60.1	115.8	149.1	76.3	100.3	
1974	45.5	124.5	140.1	68.7	94.7	
1975	66.7	*****	*****	*****	66.7	
AVE	61.0	113.5	151.4	70.5		
TABLE TOTAL	1646.3					

STABLE SEASONALITY TEST					
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F	
BETWEEN QUARTERS	22255.710	3	7418.570	82.014**	
RESIDUAL	1175.909	13	90.455		
TOTAL	23431.619	16			

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

TSP MEAN DAVIS DAM						PAGE 6, SERIES
010. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVE	
1971	63.3	112.7	153.3	70.7	100.0	
1972	63.1	114.1	151.9	70.6	99.9	
1973	63.4	114.1	151.9	70.7	100.0	
1974	63.1	113.9	152.2	71.1	100.1	
1975	62.7	*****	*****	*****	62.7	
TABLE TOTAL	1662.7					

010A. SEASONAL FACTORS ONE YEAR AHEAD					
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVE
1975	*****	113.8	152.3	71.3	112.5
1976	62.4	*****	*****	*****	62.4

TSP MEAN DAVIS DAM						PAGE 8, SERIES
012. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
1971	402.	369.	316.	341.	1427.	
1972	384.	409.	410.	371.	1575.	
1973	310.	320.	371.	380.	1382.	
1974	366.	329.	315.	385.	1396.	
1975	475.	*****	*****	*****	475.	
AVE	387.	357.	353.	369.		
TABLE TOTAL	4255.	MEAN	368.	STD. DEVIATION	42.	

$$TSP = 36.03 + .074 T$$

$$R^2 = .0675$$

$$S_{1.4} = 4.47$$

$$S_0 = 2.27$$

$$S_1 = 2.281$$

$$B = \frac{.074}{.021} = -3.2$$

TSP MEAN DAVIS DAM						PAGE 9, SERIES
013. FINAL IRREGULAR SERIES	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.	
1971	100.7	103.1	96.7	94.2	9.7	
1972	111.5	86.7	109.6	97.6	10.1	
1973	95.5	102.8	96.8	107.1	9.6	
1974	72.7	111.0	90.9	97.1	15.3	
1975	108.5	*****	*****	*****	8.5	
S.D.	13.9	8.9	7.0	4.9		
TABLE TOTAL	1682.6	MEAN	99.0	STD. DEVIATION	9.6	

TSP 2ND MAX DAVIS DAM

D 1. ORIGINAL SERIES

TSP 2ND MAX DAVIS DAM

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1971	68.	63.	109.	82.	282.
1972	70.	56.	136.	73.	335.
1973	37.	60.	82.	51.	230.
1974	32.	63.	55.	43.	193.
1975	121.	*****	*****	*****	121.
AVG	66.	61.	96.	53.	
TABLE TOTAL	1163.	MEAN	68.	STD. DEVIATION	28.

D 8. FINAL UNMODIFIED SI RATIOS

TSP 2ND MAX DAVIS DAM

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1971	79.6	83.1	183.3	61.2	101.9
1972	92.5	71.8	164.6	88.6	104.4
1973	59.7	109.2	138.4	95.2	100.1
1974	59.4	123.5	137.0	53.6	93.9
1975	85.0	*****	*****	*****	85.0
AVG	75.2	96.9	156.4	74.2	
TABLE TOTAL	1685.7				

STABLE SEASONALITY TEST				
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	18467.348	3	6155.783	15.478**
RESIDUAL	5170.419	13	397.725	
TOTAL	23637.767	16		

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE

TSP 2ND MAX DAVIS DAM

PAGE 6, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1971	73.8	92.4	157.1	76.4	99.9
1972	73.3	95.9	155.1	74.5	99.7
1973	74.5	96.0	155.3	74.7	100.1
1974	72.9	98.3	152.4	76.9	100.2
1975	71.5	*****	*****	*****	71.5
TABLE TOTAL	1671.3				

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1975	*****	99.7	150.9	78.0	109.5
1976	70.8	*****	*****	*****	70.8

D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE

TSP 2ND MAX DAVIS DAM

PAGE 8, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1971	84.	76.	5 61.	4 70.	291.
1972	75.	75.	7 84.	1 86.	321.
1973	65.	53.	1 61.	13 57.	236.
1974	57.	50.	1 42.	14 82.	231.
1975	136.	*****	*****	*****	136.
AVG	83.	63.	62.	74.	
TABLE TOTAL	1215.	MEAN	71.	STD. DEVIATION	21.

$$TSP = 70.55 + 0.0956T \quad R^2 = 0.0005 \quad S.E. = 21.90$$

$$B = \frac{0.0956}{1.08} = 0.088$$

$$S.E. = 11.11$$

$$S.E. = 1.08$$

D13. FINAL IRREGULAR SERIES

TSP 2ND MAX DAVIS DAM

PAGE 9, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.O.
1971	109.5	90.1	113.3	78.6	14.3
1972	127.1	77.6	104.0	113.6	19.0
1973	76.8	118.2	86.5	119.2	18.8
1974	77.2	128.9	86.1	71.1	24.4
1975	124.3	*****	*****	*****	24.3
S.O.	22.2	21.0	12.8	21.5	
TABLE TOTAL	1702.0	MEAN	100.1	STD. DEVIATION	19.8

SO₂ AVE DAVIS DAM

B 1. ORIGINAL SERIES

SO₂ AVE DAVIS DAM

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1971	*****	*****	*****	3.	3.
1972	3.	3.	3.	3.	12.
1973	3.	3.	3.	3.	12.
1974	3.	12.	10.	7.	32.
1975	10.	*****	*****	*****	10.
AVG	3.	6.	3.	3.	
TABLE TOTAL	69.	MEAN	5.	STD. DEVIATION	3.

$$SO_2 = .626 + .574T \quad r^2 = .524$$

$$S_{y \cdot x} = 2.38$$

$$S_e = 1.95$$

$$S_1 = .158$$

$$B = \frac{+.574}{.158} = 3.64$$

D 5. FINAL UNMODIFIED SI RATIOS

SO₂ AVE DAVIS DAM

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1971	*****	*****	*****	90.3	90.3
1972	96.5	106.5	101.6	92.3	99.2
1973	96.0	108.4	108.6	85.2	99.6
1974	35.4	151.9	114.3	77.3	99.7
1975	104.1	*****	*****	*****	104.1
AVG	88.0	122.3	108.2	86.3	
TABLE TOTAL	1480.5				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	3006.246	3	1002.082	3.351
RESIDUAL	2990.786	10	299.079	
TOTAL	5997.032	13		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP MEAN LOGANDALE

TSP MEAN LOGANDALE						PAGE 1, SERIES
B 1. ORIGINAL SERIES A/D						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
1972	338.	744.	490.	269.	1836.	
1973	184.	308.	1236.	541.	2269.	
1974	319.	709.	855.	317.	2200.	
1975	241.	*****	*****	*****	241.	
AVG	271.	587.	860.	379.		
TABLE TOTAL	6546.	MEAN	504.	STD. DEVIATION	294.	

TSP MEAN LOGANDALE						PAGE 4, SERIES
D 8. FINAL UNMODIFIED SI RATIOS						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
1972	45.4	116.5	110.0	74.6	86.7	
1973	47.9	61.2	184.5	72.3	91.5	
1974	44.6	112.5	171.0	69.4	99.4	
1975	48.7	*****	*****	*****	48.7	
AVG	46.7	96.7	155.1	72.1		
TABLE TOTAL	1158.7					
STABLE SEASONALITY TEST						
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F		
BETWEEN QUARTERS	21324.707	3	7108.236	12.605**		
RESIDUAL	5075.405	9	563.934			
TOTAL	26400.112	12				
**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL						

TSP MEAN LOGANDALE						PAGE 6, SERIES
D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
1972	46.7	109.7	171.0	72.5	100.0	
1973	46.9	109.7	170.9	72.5	100.0	
1974	46.9	109.7	170.9	72.5	100.0	
1975	47.1	*****	*****	*****	47.1	
TABLE TOTAL	1246.9					
D10A. SEASONAL FACTORS ONE YEAR AHEAD						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
1973	*****	109.7	170.9	72.5	117.7	
1974	47.1	*****	*****	*****	47.1	

TSP MEAN LOGANDALE						PAGE 8, SERIES
D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
1972	729.	632.	450.	355.	2166.	
1973	376.	498.	677.	749.	2301.	
1974	700.	621.	511.	460.	2292.	
1975	483.	*****	*****	*****	483.	
AVG	572.	584.	546.	521.		
TABLE TOTAL	7241.	MEAN	557.	STD. DEVIATION	129.	

$$TSP = 57.22 - .027T \quad R^2 = .6048 \quad S_y = 14.00 \quad B = \frac{-2.17}{1.04} = -.207$$

$$S_e = 8.24$$

$$S_1 = 1.04$$

TSP MEAN LOGANDALE						PAGE 9, SERIES
D13. FINAL IRREGULAR SERIES						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.	
1972	99.3	107.3	63.7	102.7	18.6	
1973	104.2	56.4	106.8	99.7	22.2	
1974	97.2	104.1	97.9	95.1	3.6	
1975	104.1	*****	*****	*****	6.1	
S.D.	4.0	25.7	21.4	3.2		
TABLE TOTAL	1240.4	MEAN	95.4	STD. DEVIATION	15.6	

TSP 2ND MAX LOGANDALE

D 1. ORIGINAL SERIES

TSP 2ND MAX LOGANDALE

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	46.	147.	110.	89.	392.
1973	26.	97.	159.	81.	363.
1974	38.	105.	119.	114.	376.
1975	38.	*****	*****	*****	38.
AVG	47.	114.	129.	78.	
TABLE TOTAL	1159.	MEAN	69.	STD. DEVIATION	41.

D 8. FINAL UNMODIFIED SI RATIOS

TSP 2ND MAX LOGANDALE

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	47.7	112.9	160.5	72.2	98.3
1973	43.2	122.6	159.4	76.7	100.5
1974	40.2	133.5	136.6	113.0	105.8
1975	36.7	*****	*****	*****	36.7
AVG	41.9	123.0	152.2	87.5	
TABLE TOTAL	1255.1				

STABLE SEASONALITY TEST

	SUP OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	23563.397	3	7854.466	43.019**
RESIDUAL	1643.243	9	182.583	
TOTAL	25206.640	12		

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS. 3X5 MOVING AVERAGE

TSP 2ND MAX LOGANDALE

PAGE 6, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	43.1	124.2	153.6	79.6	100.1
1973	42.4	124.3	153.7	79.6	100.0
1974	42.4	124.3	153.9	79.6	100.1
1975	41.7	*****	*****	*****	41.7
TABLE TOTAL	1242.3				

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1973	*****	124.3	154.0	79.7	119.3
1974	41.3	*****	*****	*****	41.3

D12. FINAL TREND-CYCLE. 5-TERM HENDERSON CURVE

TSP 2ND MAX LOGANDALE

PAGE 8, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	176.	131.	70.	52.	429.
1973	59.	81.	100.	102.	341.
1974	92.	81.	87.	93.	357.
1975	100.	*****	*****	*****	100.
AVG	107.	97.	86.	84.	
TABLE TOTAL	1228.	MEAN	94.	STD. DEVIATION	31.

$$TSP = 109.10 - 2.08T$$

$$S_1 = 0.0497$$

$$S_2 = 33.50$$

$$S_3 = 17.95$$

$$S_4 = 0.39$$

$$B = \frac{-2.08}{2.37} = -0.877$$

D13. FINAL IRREGULAR SERIES

TSP 2ND MAX LOGANDALE

PAGE 9, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.
1972	113.3	90.4	102.1	94.1	8.7
1973	104.3	96.4	103.9	100.1	8.4
1974	97.9	104.7	88.6	146.3	24.8
1975	91.1	*****	*****	*****	8.9
S.D.	8.4	6.4	7.1	27.0	
TABLE TOTAL	1333.3	MEAN	102.6	STD. DEVIATION	14.3

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TSP MEAN HENDERSON PO

D 1. ORIGINAL SERIES TSP MEAN HENDERSON PO PAGE 1. SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	1462.	848.	788.	1244.	4362.
1973	721.	951.	1111.	1577.	4360.
1974	965.	1356.	1126.	1015.	4462.
1975	911.	*****	*****	*****	911.
AVG	1015.	1052.	1008.	1285.	
TABLE TOTAL	14095.	MEAN	1084.	STD. DEVIATION	254.

D 8. FINAL UNMODIFIED SI RATIOS TSP MEAN HENDERSON PO PAGE 4. SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	88.9	69.6	31.7	135.9	96.5
1973	77.0	94.6	97.2	127.5	93.1
1974	74.9	101.8	100.6	102.1	94.9
1975	86.1	*****	*****	*****	86.1
AVG	81.7	88.7	96.5	121.8	
TABLE TOTAL	1247.9				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	2977.089	3	992.363	6.518**
RESIDUAL	1370.246	9	152.250	
TOTAL	4347.335	12		

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE TSP MEAN HENDERSON PO PAGE 6. SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	82.0	94.7	97.5	125.4	99.9
1973	82.5	94.6	97.5	125.4	100.0
1974	82.5	94.6	97.6	125.5	100.1
1975	81.7	*****	*****	*****	81.7
TABLE TOTAL	1281.6				

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1975	*****	94.6	97.6	125.6	100.0
1976	81.2	*****	*****	*****	81.2

D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE TSP MEAN HENDERSON PO PAGE 8. SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	1574.	1191.	874.	904.	4543.
1973	937.	987.	1152.	1203.	4279.
1974	1276.	1320.	1152.	972.	4720.
1975	1011.	*****	*****	*****	1011.
AVG	1200.	1169.	1059.	1026.	
TABLE TOTAL	14562.	MEAN	1120.	STD. DEVIATION	192.

$$TSP = 116.0 - 0.657T$$

$$S_1 = 0.0169$$

$$S_2 = 20.71$$

$$S_3 = 12.19$$

$$S_4 = 1.54$$

$$B = \frac{-0.657}{1.54} = -0.43$$

D13. FINAL IRREGULAR SERIES TSP MEAN HENDERSON PO PAGE 9. SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.
1972	113.2	75.2	92.5	111.5	30.0
1973	95.2	101.8	98.9	104.6	35.6
1974	91.6	107.9	100.1	83.2	4.2
1975	110.3	*****	*****	*****	10.2
AVG	10.0	15.1	8.4	12.1	10.3
TABLE TOTAL	1284.1	MEAN	90.8	STD. DEVIATION	10.9

TSP 2ND MAX HENDERSON PO

B 1. ORIGINAL SERIES

TSP 2ND MAX HENDERSON PO

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	235.	153.	132.	213.	733.
1973	117.	133.	152.	248.	650.
1974	122.	228.	156.	162.	668.
1975	135.	*****	*****	*****	185.
AVG	152.	171.	147.	207.	
TABLE TOTAL	2185.	MEAN	168.	STD. DEVIATION	99.

D 8. FINAL UNMODIFIED SI RATIOS

TSP 2ND MAX HENDERSON PO

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	91.6	79.3	92.4	135.9	99.8
1973	80.2	98.9	92.1	134.7	99.5
1974	61.4	109.9	91.8	112.7	94.0
1975	87.8	*****	*****	*****	87.8
AVG	80.2	93.4	92.1	127.8	
TABLE TOTAL	1260.7				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	4074.216	3	1358.072	9.0014
RESIDUAL	1357.847	9	150.672	
TOTAL	5432.063	12		

***STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE

TSP 2ND MAX HENDERSON PO

PAGE 6, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	84.0	92.7	93.4	129.5	99.9
1973	84.5	92.7	93.3	129.5	100.0
1974	84.5	92.7	93.5	129.7	100.1
1975	83.5	*****	*****	*****	83.5
TABLE TOTAL	1283.4				

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1975	*****	92.7	93.5	129.7	105.3
1976	83.0	*****	*****	*****	83.0

D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE

TSP 2ND MAX HENDERSON PO

PAGE 8, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	1 244.	2 188.	2 145.	1 151.	727.
1973	3 145.	4 143.	7 167.	8 178.	633.
1974	4 198.	5 207.	1 174.	12 139.	718.
1975	5 146.	*****	*****	*****	146.
AVG	183.	179.	162.	156.	
TABLE TOTAL	2225.	MEAN	171.	STD. DEVIATION	30.

TSP = 153.71 - 2.24T

$S_0 = 15.59$

$S_1 = 2.34$

$B = \frac{-0.24}{4.37} = -.06$

D13. FINAL IRREGULAR SERIES

TSP 2ND MAX HENDERSON PO

PAGE 9, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.
1972	114.9	87.9	97.5	108.4	18.3
1973	95.2	100.5	97.8	107.4	4.5
1974	73.0	118.7	96.0	90.0	17.8
1975	110.4	*****	*****	*****	18.4
S.D.	16.4	12.9	8.0	8.6	
TABLE TOTAL	1297.6	MEAN	99.8	STD. DEVIATION	11.9

TSP MEAN HENDERSON HS

TSP MEAN HENDERSON HS						PAGE 1, SERIES
B 1. ORIGINAL SERIES #10	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	1034.	526.	664.	643.	2867.	
1973	412.	514.	740.	1014.	2680.	
1974	640.	561.	525.	639.	2375.	
1975	636.	*****	*****	*****	636.	
AVG	683.	534.	643.	766.		
TABLE TOTAL	4558.	MEAN	658.	STD. DEVIATION	176.	

TSP MEAN HENDERSON HS						PAGE 4, SERIES
D 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	94.2	59.4	107.3	124.0	96.5	
1973	83.5	86.4	102.1	127.5	99.9	
1974	85.4	87.1	101.8	113.7	97.0	
1975	95.0	*****	*****	*****	95.0	
AVG	89.5	77.7	103.7	122.0		
TABLE TOTAL	1268.2					
STABLE SEASONALITY TEST						
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F		
BETWEEN QUARTERS	3352.687	3	1117.562	13.787**		
RESIDUAL	729.558	9	81.062			
TOTAL	4082.246	12				
**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL						

TSP MEAN HENDERSON HS						PAGE 6, SERIES
D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	89.0	84.2	104.0	122.2	99.9	
1973	89.7	84.1	103.9	122.2	100.0	
1974	89.7	84.1	104.0	122.3	100.0	
1975	89.1	*****	*****	*****	89.1	
TABLE TOTAL	1288.8					
D10A. SEASONAL FACTORS ONE YEAR AHEAD						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
1975	*****	84.1	104.1	122.4	103.5	
1976	88.9	*****	*****	*****	88.9	

TSP MEAN HENDERSON HS						PAGE 8, SERIES
D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	1063.	877.	763.	912.	3088.	
1973	922.	986.	735.	791.	2605.	
1974	754.	634.	526.	556.	2471.	
1975	652.	*****	*****	*****	652.	
AVG	740.	699.	632.	620.		
TABLE TOTAL	4814.	MEAN	678.	STD. DEVIATION	157.	

$$TSP = 20.72 - 1.27T$$

$$N = .197$$

$$S_{y \cdot x} = 15.34$$

$$S_y = 9.02$$

$$S_x = 1.14$$

$$B = \frac{-1.27}{1.14} = -1.12$$

TSP MEAN HENDERSON HS						PAGE 9, SERIES
D13. FINAL IRREGULAR SERIES	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.	
YEAR						
1972	109.2	71.2	100.5	103.0	15.2	
1973	93.3	104.2	96.9	104.0	4.9	
1974	95.8	105.1	95.9	94.0	4.9	
1975	109.5	*****	*****	*****	9.5	
S.D.	7.7	17.1	90.7	3.8	9.8	
TABLE TOTAL	1283.5	MEAN	90.7	STD. DEVIATION	9.5	

TSP 2ND MAX HENDERSON HS

B 1. ORIGINAL SERIES

TSP 2ND MAX HENDERSON HS

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	204.	90.	112.	102.	508.
1973	75.	79.	119.	132.	405.
1974	120.	68.	81.	104.	373.
1975	95.	*****	*****	*****	95.
AVG	124.	79.	104.	113.	
TABLE TOTAL	1381.	MEAN	106.	STD. DEVIATION	34.

D 8. FINAL UNMODIFIED SI RATIOS

TSP 2ND MAX HENDERSON HS

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	125.2	67.6	112.4	117.6	105.7
1973	90.4	80.0	105.4	112.3	97.1
1974	108.4	74.1	101.0	119.5	100.7
1975	102.5	*****	*****	*****	102.5
AVG	106.6	74.0	106.3	116.5	
TABLE TOTAL	1316.7				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	3120.067	3	1040.022	11.773**
RESIDUAL	795.062	9	88.340	
TOTAL	3915.129	12		

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE

TSP 2ND MAX HENDERSON HS

PAGE 6, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	105.0	73.6	105.7	115.9	100.1
1973	104.7	73.6	105.6	115.9	100.0
1974	104.7	73.6	105.9	116.1	100.1
1975	103.6	*****	*****	*****	103.6
TABLE TOTAL	1304.2				

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1975	*****	73.6	106.0	116.2	98.6
1976	103.0	*****	*****	*****	103.0

D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE

TSP 2ND MAX HENDERSON HS

PAGE 8, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	161.	134.	102.	86.	483.
1973	85.	100.	114.	116.	415.
1974	111.	93.	81.	86.	371.
1975	92.	*****	*****	*****	92.
AVG	112.	109.	99.	96.	
TABLE TOTAL	1360.	MEAN	105.	STD. DEVIATION	22.

TSP = 127.35 - 3.54T

R² = .361

S_y = 17.20

S_e = 11.30

S_t = 1.92

3 = $\frac{-3.54}{1.92}$

72-1

TSP = 114.41 - 1.94T

R² = .187

S_y = 15.32

S_e = 10.56

S_t = 1.28

0 = $\frac{-1.94}{1.28}$

D13. FINAL IRREGULAR SERIES

TSP 2ND MAX HENDERSON HS

PAGE 9, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.
1972	120.4	90.9	103.4	102.8	11.4
1973	85.9	107.0	98.7	98.4	7.9
1974	103.4	99.3	94.3	104.1	8.9
1975	99.7	*****	*****	*****	8.3
S.D.	12.3	8.6	8.9	8.0	
TABLE TOTAL	1400.6	MEAN	100.7	STD. DEVIATION	8.0

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TSP MEAN SUNRISE

TSP MEAN SUNRISE						PAGE 1, SERIES
B 1. ORIGINAL SERIES X 10	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	1641.	856.	1044.	651.	4212.	
1973	522.	862.	1195.	1725.	4304.	
1974	917.	1175.	995.	1083.	4170.	
1975	1155.	*****	*****	*****	1155.	
AVG	1064.	964.	1070.	1155.		
TABLE TOTAL	13041.	MEAN	1065.	STD. DEVIATION	829.	

$$TSP = 102.13 + .620 T \quad N^2 = .0050 \quad S_{y \cdot x} = 35.67$$

$$S_0 = 2099 \quad B = \frac{-620}{2.64} = -234$$

$$S_1 = 2.64$$

TSP MEAN SUNRISE						PAGE 4, SERIES
D 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	87.0	60.0	120.8	102.4	94.5	
1973	80.5	100.1	101.7	125.8	102.0	
1974	70.7	106.6	106.6	100.8	96.2	
1975	86.3	*****	*****	*****	86.3	
AVG	81.1	88.9	112.4	109.7		
TABLE TOTAL	1257.2					
STABLE SEASONALITY TEST						
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F		
BETWEEN QUARTERS	2394.289	3	798.096	3.195		
RESIDUAL	2247.970	9	249.774			
TOTAL	4642.259	12				
NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL						

TSP 2ND MAX SUNRISE

B 1. ORIGINAL SERIES

YEAR	1ST QUAR
1972	195.
1973	98.
1974	118.
1975	207.

AVE

153.

TABLE TOTAL

TSP 2ND MAX SUNRISE

2ND QUAR
147.
114.
144.

135.

MEAN

3RD QUAR
170.
160.
138.

159.

STD. DEVIATION

4TH QUAR
124.
296.
174.

199.

PAGE 1, SERIES

TOTAL
436.
460.
576.
207.

$$TSP = 145.65 + 2.126 T$$

$$A = .0247$$

$$S_{y.x} = 54.36$$

$$S_0 = 31.92$$

$$S_1 = 4.030$$

$$B = \frac{2.126}{4.030} = .537$$

D 8. FINAL UNMODIFIED SI RATIOS

YEAR	1ST QUAR
1972	90.8
1973	83.7
1974	70.2
1975	93.2

AVE

84.5

TABLE TOTAL

TSP 2ND MAX SUNRISE

2ND QUAR
81.2
90.7
97.0

89.6

3RD QUAR
124.9
109.6
103.3

113.3

4TH QUAR
106.6
172.7
103.0

127.4

PAGE 4, SERIES

AVE
100.9
114.2
93.9
93.2

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	4002.275	3	1334.092	3.213
RESIDUAL	3737.026	9	415.223	
TOTAL	7739.302	12		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP MEAN MCCARRAN TERM

TSP MEAN MCCARRAN TERM						PAGE 1, SERIES
B 1. ORIGINAL SERIES <10	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	780.	711.	644.	402.	2537.	
1973	427.	468.	915.	816.	2626.	
1974	667.	976.	763.	656.	3062.	
1975	752.	*****	*****	*****	752.	
AVG	657.	718.	774.	625.		
TABLE TOTAL	2577.	PEAN	691.	STD. DEVIATION	169.	

$$TSP = 59.12 + 1.419 T \quad R^2 = .6722 \quad S_{y.x} = 17.44$$

$$S_e = 10.26 \quad B = \frac{1.419}{1.293} = 1.097$$

$$S_x = 1.293$$

TSP MEAN MCCARRAN TERM						PAGE 4, SERIES
D 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	91.5	96.8	120.7	90.4	99.8	
1973	94.3	83.2	124.1	97.5	99.8	
1974	80.7	120.6	113.2	92.8	103.9	
1975	93.2	*****	*****	*****	93.2	
AVG	89.9	102.9	119.3	93.6		
TABLE TOTAL	1307.1					
STABLE SEASONALITY TEST						
	SUM OF	DEGREES OF	MEAN	F		
	SQUARES	FREEDOM	SQUARE			
BETWEEN QUARTERS	1672.699	3	557.566	3.857		
RESIDUAL	1301.125	9	144.569			
TOTAL	2973.825	12				
NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL						

TSP 2ND MAX MCCARRAN TERM

B 1. ORIGINAL SERIES

TSP2ND MAX MCCARRAN TERM

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	98.	106.	106.	87.	397.
1973	66.	79.	142.	116.	403.
1974	90.	206.	107.	103.	506.
1975	134.	*****	*****	*****	134.
AVG	97.	130.	118.	103.	
TABLE TOTAL	1442.	MEAN	111.	STD. DEVIATION	34.

$$TSP = 25.65 + 3.610 T \quad N = .159$$

$$S_{y \cdot x} = 33.72$$

$$S_0 = 19.84$$

$$S_1 = 2.50$$

$$B = \frac{3.61}{2.50} = 1.44$$

D 8. FINAL UNMODIFIED SI RATIOS

TSP2ND MAX MCCARRAN TERM

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	80.8	100.3	120.2	100.7	100.5
1973	80.7	87.6	130.4	97.8	99.1
1974	73.1	167.3	103.0	88.3	108.0
1975	87.7	*****	*****	*****	87.7
AVG	80.6	118.4	117.9	95.6	
TABLE TOTAL	1416.2				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	3520.455	3	1173.485	2.490
RESIDUAL	4242.021	9	471.336	
TOTAL	7762.476	12		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP MEAN SHADOW LANE

TSP MEAN SHADOW LANE						PAGE 1, SERIES
B 1. ORIGINAL SERIES X 10	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	991.	787.	864.	916.	3558.	
1973	555.	657.	840.	1111.	3163.	
1974	745.	1303.	963.	819.	3830.	
1975	1001.	*****	*****	*****	1001.	
AVG	823.	916.	889.	949.		
TABLE TOTAL	11552.	MEAN	STD. DEVIATION	187.		

$$TSP = 73.22 + 1.435T \quad N^2 = .0826 \quad S_y = 19.47$$

$$S_x = 11.45 \quad B = \frac{1.435}{1.443} = 0.99$$

$$S_e = 1.443$$

TSP MEAN SHADOW LANE						PAGE 4, SERIES
B 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	87.2	84.7	112.7	114.7	99.8	
1973	79.0	95.1	105.8	120.0	100.0	
1974	70.7	115.9	101.1	85.6	93.3	
1975	86.7	*****	*****	*****	86.7	
AVG	80.9	98.6	106.5	106.8		
TABLE TOTAL	1259.2					
STABLE SEASONALITY TEST						
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F		
BETWEEN QUARTERS	1604.607	3	534.869	3.336		
RESIDUAL	1443.031	9	160.337			
TOTAL	3047.638	12				
NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL						

TSP 2ND MAX SHADOW LANE

B 1. ORIGINAL SERIES

TSP 2ND MAX SHADOW LANE

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	142.	135.	120.	152.	549.
1973	100.	84.	139.	162.	485.
1974	109.	107.	122.	150.	568.
1975	107.	*****	*****	*****	107.
AVG	135.	135.	127.	155.	
TABLE TOTAL	1769.	MEAN	138.	STD. DEVIATION	30.

$$TSP = 116.31 + 3.044T \quad r^2 = .146$$

$$S_{y.x} = 29.70$$

$$S_e = 17.37$$

$$S_1 = 2.217$$

$$B = \frac{3.044}{2.217} = 1.373$$

D 8. FINAL UNMODIFIED SI RATIOS

TSP 2ND MAX SHADOW LANE

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	87.0	94.2	97.7	122.8	100.4
1973	89.2	75.7	105.3	119.2	98.4
1974	75.6	121.7	94.2	102.4	98.5
1975	96.9	*****	*****	*****	96.9
AVG	87.2	97.2	100.4	114.8	
TABLE TOTAL	1285.8				

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	1324.523	3	441.441	2.382
RESIDUAL	1667.796	9	185.311	
TOTAL	2992.120	12		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP MEAN N LAS VEGAS

TSP MEAN N LAS VEGAS						PAGE 1, SERIES	
B. 1. ORIGINAL SERIES X 10							
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL		
1972	1956.	886.	1461.	1461.	5764.		
1973	751.	1009.	1077.	1351.	4189.		
1974	1164.	1032.	895.	926.	4017.		
1975	987.	*****	*****	*****	987.		
AVE	1215.	976.	1144.	1246.			
TABLE TOTAL	14956.	MEAN	1150.	STD. DEVIATION	315.		

$$TSP = 145.90 - 4.394T \quad r^2 = .272$$

$$S_{1.2} = 27.27$$

$$S_1 = 17.22$$

$$S_2 = 2.157$$

$$B = \frac{-4.394}{2.157} = -2.03$$

without 72-1

$$TSP = 122.81 - 1.931T \quad r^2 = .0903$$

$$S_{1.2} = 23.18$$

$$S_1 = 16.00$$

$$S_2 = 1.931$$

$$B = \frac{-1.931}{1.931} = -.996$$

TSP MEAN N LAS VEGAS					PAGE 4, SERIES	
D 8. FINAL UNMODIFIED SI RATIOS						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
1972	98.2	51.6	103.3	120.1	93.3	
1973	74.6	99.8	98.2	113.0	96.4	
1974	94.2	92.4	100.9	104.0	97.9	
1975	99.3	*****	*****	*****	99.3	
AVE	91.6	81.3	100.8	112.4		

STABLE SEASONALITY TEST			
	SUM OF SQUARES	DEGREES OF FREEDOM	F
BETWEEN QUARTERS	1603.937	3	534.646
RESIDUAL	1886.103	9	209.567
TOTAL	3490.040	12	

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP 2ND MAX N LAS VEGAS

B 1. ORIGINAL SERIES

TSP 2ND MAX N LAS VEGAS

PAGE 1, SERIES

ORIGINAL SERIES						
YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
1972	236.	156.	249.	184.	825.	
1973	143.	129.	147.	154.	573.	
1974	151.	153.	110.	141.	555.	
1975	151.	*****	*****	*****	151.	
AVE	170.	146.	169.	160.		
	TABLE TOTAL	2106.	MEAN	162.	STD. DEVIATION	38.

$$TSP = 207.51 - 6.544T$$

$$r^2 = .4158$$

$$S_{y \cdot x} = 31.55$$

$$S_e = 16.56$$

$$S_x = 2.339$$

$$B = \frac{-6.544}{2.339} = -2.777$$

without 72-1

$$TSP = 193.0 - 4.965T$$

$$r^2 = .2752$$

$$S_{y \cdot x} = 30.47$$

$$S_e = 21.04$$

$$S_x = 2.54$$

$$B = \frac{-4.965}{2.54} = -1.95$$

TSP 2ND MAX N LAS VEGAS

PAGE 4, SERIES

D 8. FINAL UNMODIFIED SI RATIOS

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVE
1972	106.1	73.7	123.0	98.5	100.3
1973	97.0	94.9	104.3	103.1	99.8
1974	95.6	105.3	86.9	105.6	98.4
1975	99.9	*****	*****	*****	99.9
AVE	99.7	91.3	104.7	102.4	
	TABLE TOTAL	1293.9			

STABLE SEASONALITY TEST

	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F
BETWEEN QUARTERS	308.532	3	102.844	0.735
RESIDUAL	1260.149	9	140.017	
TOTAL	1568.681	12		

NO EVIDENCE OF STABLE SEASONALITY AT THE 1 PERCENT LEVEL

TSP MEAN NELLIS AF BASE

D 1. ORIGINAL SERIES

TSP MEAN NELLIS AF BASE

PAGE 1, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	985.	839.	872.	567.	3263.
1973	319.	381.	912.	634.	2446.
1974	440.	971.	616.	392.	2419.
1975	519.	*****	*****	*****	519.
AVG	566.	797.	800.	531.	
TABLE TOTAL	4647.	MEAN	665.	STD. DEVIATION	218.

D 6. FINAL UN-MODIFIED SI RATIOS

TSP MEAN NELLIS AF BASE

PAGE 4, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	75.8	87.4	140.9	94.3	99.1
1973	62.5	106.3	135.0	89.7	99.1
1974	61.5	146.3	127.3	74.2	102.3
1975	74.0	*****	*****	*****	74.0
AVG	67.9	113.3	135.7	85.7	
TABLE TOTAL	1276.1				

STABLE SEASONALITY TEST			
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE
BETWEEN QUARTERS	9042.252	3	3014.084
RESIDUAL	2274.110	9	252.679
TOTAL	11316.363	12	
F 11.923**			

**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL

D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE

TSP MEAN NELLIS AF BASE

PAGE 6, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1972	67.7	108.7	136.8	86.3	99.9
1973	68.4	108.6	136.7	86.3	100.0
1974	68.4	108.6	136.8	86.4	100.1
1975	67.7	*****	*****	*****	67.7

TABLE TOTAL 1267.4

D10A. SEASONAL FACTORS ONE YEAR AHEAD

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG
1975	*****	108.6	136.9	86.3	110.6
1976	67.3	*****	*****	*****	67.3

D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE

TSP MEAN NELLIS AF BASE

PAGE 8, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL
1972	1258.	940.	549.	592.	3439.
1973	515.	530.	763.	700.	2411.
1974	717.	660.	506.	511.	2394.
1975	664.	*****	*****	*****	664.
AVG	789.	710.	606.	601.	
TABLE TOTAL	4907.	MEAN	605.	STD. DEVIATION	200.

$$T = 17.7 - 3.02T \quad S_1 = 17.71 \quad S_2 = 10.57 \quad S_3 = 1.23$$

$$T = 73.67 - 1.24T \quad S_1 = 11.94 \quad S_2 = 2.27 \quad S_3 = 1.00$$

D13. FINAL IRREGULAR SERIES

TSP MEAN NELLIS AF BASE

PAGE 9, SERIES

YEAR	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.
1972	115.7	82.1	98.3	110.9	13.1
1973	90.5	100.9	100.4	104.9	5.0
1974	89.7	135.4	89.0	88.8	28.0
1975	115.5	*****	*****	*****	15.5
S.D.	13.1	22.9	6.4	9.4	
TABLE TOTAL	1322.1	MEAN	101.7	STD. DEVIATION	10.2

60<

TSP 2ND MAX NELLIS AF BASE

TSP 2ND MAX NELLIS AF BASE						PAGE 1, SERIES
B 1. ORIGINAL SERIES	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	156.	139.	136.	107.	538.	
1973	95.	100.	160.	133.	488.	
1974	65.	147.	77.	76.	365.	
1975	86.	*****	*****	*****	86.	
AVG	90.	131.	125.	105.		
TABLE TOTAL	1445.	MEAN	111.	STD. DEVIATION	35.	

TSP 2ND MAX NELLIS AF BASE						PAGE 4, SERIES
D 8. FINAL UNMODIFIED SI RATIOS	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	67.4	83.7	132.4	105.3	97.2	
1973	58.9	105.2	126.2	102.9	98.8	
1974	55.5	148.0	110.5	86.5	100.1	
1975	68.2	*****	*****	*****	68.2	
AVG	62.5	112.3	123.7	98.3		
TABLE TOTAL	1252.7					
STABLE SEASONALITY TEST						
	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARE	F		
BETWEEN QUARTERS	7591.178	3	2530.393	8.296**		
RESIDUAL	2744.958	9	304.995			
TOTAL	10336.137	12				
**STABLE SEASONALITY PRESENT AT THE 1 PERCENT LEVEL						

TSP 2ND MAX NELLIS AF BASE						PAGE 6, SERIES
D10. FINAL SEASONAL FACTORS, 3X5 MOVING AVERAGE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1972	62.7	111.4	125.6	99.7	99.9	
1973	63.4	111.3	125.3	99.7	100.0	
1974	63.4	111.3	125.6	99.8	100.0	
1975	62.8	*****	*****	*****	62.8	
TABLE TOTAL	1262.5					
D10A. SEASONAL FACTORS ONE YEAR AHEAD	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	AVG	
YEAR						
1975	*****	111.3	125.7	99.8	112.3	
1976	62.5	*****	*****	*****	62.5	

TSP 2ND MAX NELLIS AF BASE						PAGE 8, SERIES
D12. FINAL TREND-CYCLE, 5-TERM HENDERSON CURVE	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	TOTAL	
YEAR						
1972	215.	161.	110.	99.	586.	
1973	89.	99.	125.	126.	440.	
1974	117.	98.	73.	84.	372.	
1975	118.	*****	*****	*****	118.	
AVG	135.	119.	103.	103.		
TABLE TOTAL	1515.	MEAN	117.	STD. DEVIATION	36.	

$$TSP = 156.3 - 5.69 T$$

$$R^2 = .356$$

$$S_y = 31.14$$

$$S_e = 17.73$$

$$S = 2.31$$

$$C = \frac{-5.69}{2.31} = -2.46$$

$$\text{nothing } 72-1 \quad TSP = 122.9 - 2.76 T$$

$$R^2 = .181$$

$$S_y = 22.23$$

$$S_e = 15.34$$

$$S = 1.26$$

$$B = \frac{-2.76}{1.26} = -2.19$$

TSP 2ND MAX NELLIS AF BASE						PAGE 9, SERIES
D13. FINAL IRREGULAR SERIES	1ST QUAR	2ND QUAR	3RD QUAR	4TH QUAR	S.D.	
YEAR						
1972	115.6	77.2	100.1	107.9	14.4	
1973	93.5	98.4	101.8	105.4	4.4	
1974	87.8	135.3	83.7	90.1	21.8	
1975	116.1	*****	*****	*****	16.1	
S.D.	13.2	24.3	9.4	8.0		
TABLE TOTAL	1313.0	MEAN	101.0	STD. DEVIATION	15.0	



APPENDIX C
NEDS COUNTY EMISSIONS REPORTS

NATIONAL EMISSIONS DATA SYSTEM
 ENVIRONMENTAL PROTECTION AGENCY

COUNTY EMISSIONS REPORT
 YUMA COUNTY, ARIZONA

RUN DATE: FRIDAY
 EMISSIONS AS OF: TUESDAY

FEBRUARY 07, 1976
 FEBRUARY 03, 1976

PARTICULATES
 TONS / YR
 SOX
 TONS / YR
 NOX
 TONS / YR
 HC
 TONS / YR
 CO
 TONS / YR

FUEL COMBUSTION

EXTERNAL COMBUSTION

RESIDENTIAL FUEL (AREA)

NATURAL GAS	3	0	26	3	6
WOOD	14	1	7	14	14
TOTAL (RESIDENTIAL)	21	1	33	17	20

ELEC GENERATION (POINT)

DISTILLATE OIL	2	27	22	0	1
NATURAL GAS	14	1	864	1	24
TOTAL (ELEC GEN)	16	28	886	2	25

INDUSTRIAL FUEL

DISTILLATE OIL	1	5	54	0	0
AREA SOURCES					
NATURAL GAS	1	0	10	0	1
POINT SOURCES					
TOTAL (INDUSTRIAL)	1	5	5	0	0
AREA SOURCES					
POINT SOURCES	1	0	10	0	1

COMM-INSTITUTIONAL FUEL

RESIDUAL OIL	1	3	1	0	0
AREA SOURCES					
DISTILLATE OIL	2	4	9	0	1
AREA SOURCES					
NATURAL GAS	4	0	45	3	7
AREA SOURCES					
TOTAL (COMM-INST)	7	11	55	4	8
AREA SOURCES					

TOTAL (PAPER-MILL)
AREA SOURCES
POINT SOURCES

28 17 93 20 29
17 24 896 2 26

TOTAL (FUEL COMBUSTION)

AREA SOURCES
POINT SOURCES

24 17 43 20 29
17 24 896 2 26

INDUSTRIAL PROCESS (POINT)

FOOD/AGRICULTURAL
MINERAL PRODUCTS
EVAPORATION
TOTAL (INDUSTRIAL)

509 0 0 0 0
9 0 0 0 0
0 0 0 0 0
517 0 0 13 0

SOLID WASTE DISPOSAL

RESIDENTIAL (APFA)

ON SITE INCINERATION
OPEN BURNING
TOTAL (RESIDENTIAL)

87 1 3 243 730
34 2 13 63 179
120 3 15 306 909

COMMERCIAL-INSTITUTIONAL

ON SITE INCINERATION
AREA SOURCES
OPEN BURNING

7 2 3 5 10
11 1 4 21 60
18 3 7 26 70

TOTAL (COMM-INST)
AREA SOURCES

INDUSTRIAL

ON SITE INCINERATION
AREA SOURCES
OPEN BURNING

44 14 16 28 63
44 3 16 83 234
88 16 33 110 297

TOTAL (INDUSTRIAL)
AREA SOURCES

TOTAL (SOLID WASTE DISC)

AREA SOURCES

227 23 55 442 1276

TRANSPORTATION (AREA)

LAND VEHICLES

GASOLINE

317 42 2470 4261 25866

HEAVY VEHICLES

11167

1968

732

26

69

OFF HIGHWAY TOTAL (GASOLINE)

3652
40686

322
6550

114
3516

5
113

10
396

DIESEL

HEAVY VEHICLES OFF HIGHWAY MAIL TOTAL (DIESEL)

1492
74
122
1688

323
29
88
440

2509
264
344
3118

279
53
354

149
24
23
247

AIRCRAFT

MILITARY CIVIL COMMERCIAL TOTAL (AIRCRAFT)

1116
448
91
1655

1039
78
44
1162

215
16
34
264

85
4
3
92

447
14
2
467

VESSELS

GASOLINE TOTAL (VESSELS)

1252
1252

394
394

12
12

3
3

0
0

GAS HANDLING EVAP LOSS

0

658

0

0

0

TOTAL (TRANSPORTATION)

45280

9204

6910

562

1109

MISCELLANEOUS (AREA) *****

STRUCTURAL FIRMS FROST CONTROL SOLVENT EVAPORATION LOSS TOTAL (MISCELLANEOUS)

8
165
0
173

1
322
152
475

0
0
0
0

0
0
0
0

4
1
0
5

GRAND TOTAL *****

AREA SOURCES TOTAL SOURCES TOTAL

46758
26
46784

10141
15
10156

7059
846
7955

602
26
630

1349
534
1903

OFFICE OF EMISSIONS DATA SYSTEM

ENVIRONMENTAL PROTECTION AGENCY

COUNTY EMISSIONS REPORT
 MOHAVE COUNTY, AZ 1/1/76

RUN DATE: TUESDAY FEBRUARY 07, 1976
 EMISSIONS AS OF: TUESDAY FEBRUARY 03, 1976

PARTICULATES TONS / YR	SOX TONS / YR	NOX TONS / YR	HC TONS / YR	CO TONS / YR
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FUEL COMBUSTION

EXTERNAL COMBUSTION

RESIDENTIAL FUEL (AREA)

NATURAL GAS	1	0	5	1	1
TOTAL (RESIDENTIAL)	1	0	5	1	1

INDUSTRIAL FUEL

DISTILLATE OIL AREA SOURCES	1	2	2	0	0
NATURAL GAS AREA SOURCES	1	0	21	0	2
TOTAL (INDUSTRIAL)	2	2	23	0	2

COMM-INSTITUTIONAL FUEL

RESIDUAL OIL AREA SOURCES	0	1	1	0	0
DISTILLATE OIL AREA SOURCES	1	3	4	0	0
NATURAL GAS AREA SOURCES	2	0	22	1	4
POINT SOURCES	22	2399	4	0	1
TOTAL (COMM-INST)	3	5	26	2	4
AREA SOURCES	22	2399	4	0	1
POINT SOURCES					

TOTAL (EXTERNAL COMM)	5	7	54	3	7
AREA SOURCES	22	2399	4	0	1
POINT SOURCES					

INTERNAL COMBUSTION (VEH)

INDUSTRIAL FUEL

DISTILLATE OIL
TOTAL (INDUSTRIAL)

0 1 2 0 0

TOTAL (INTERNAL COMB)

0 1 2 0 0

TOTAL (FUEL COMBUSTION)

0 1 2 0 0

AREA SOURCES
POINT SOURCES

5 7 54 3 7
22 2400 6 0 1

INDUSTRIAL PROCESS (POINT) *****

FOOD/AGRICULTURAL
MINERAL PRODUCTS
TOTAL (INDUSTRIAL)

2 0 0 0 0
224 0 0 12 0
225 0 0 12 0

SOLID WASTE DISPOSAL *****

RESIDENTIAL (APEA)

ON SITE INCINERATION
OPEN BURNING
TOTAL (RESIDENTIAL)

37 1 1 103 310
14 1 1 27 77
51 1 1 130 387

COMMERCIAL-INSTITUTIONAL

ON SITE INCINERATION
APEA SOURCES
OPEN BURNING
APEA SOURCES
TOTAL (COMM-INST)
APEA SOURCES

3 1 1 2 5
5 0 2 9 26
8 1 3 11 30

INDUSTRIAL

ON SITE INCINERATION
APEA SOURCES
OPEN BURNING
APEA SOURCES
TOTAL (INDUSTRIAL)
APEA SOURCES

8 3 3 5 12
4 1 3 17 47
17 3 6 22 59

TOTAL (SOLID WASTE DISPOSAL)

74 6 16 163 476

AREA SOURCES

TRANSPORTATION (APEA) *****

LAND VEHICLES

GASOLINE

LIGHT VEHICLES
HEAVY VEHICLES
OFF HIGHWAY
TOTAL (GASOLINE)

223
44
2
274

DISEL

59
14
1
77

1974
542
27
2543

2714
1233
76
4027

14731
6593
862
22185

HEAVY VEHICLES
OFF HIGHWAY
TOTAL (DIESEL)

74
10
10
94

109
9
23
141

1035
111
148
1293

109
12
38
159

419
31
52
502

AIRCRAFT

CIVIL
COMMERCIAL
TOTAL (AIRCRAFT)

2
2
10

2
2
4

7
29
30

36
30
66

207
62
269

VESSLS

GASOLINE
TOTAL (VESSELS)

0
0
0

16
16
0

70
70
0

2378
2378
404

7560
7560
0

GAS HANDLING & VAPOR LOSS
TOTAL (TRANSPORATION)

341

234

3937

7034

30516

MISCELLANEOUS (APEA)

STRUCTURAL FINES
SOLVENT EVAPORATION LOSS
TOTAL (MISCELLANEOUS)

6
0
0
6

0
0
0
0

0
0
0
0

1
65
66

12
0
12

GRAND TOTAL

APEA SOURCES
POINT SOURCES
TOTAL

444
244
716

251
2400
2651

4007
6
4013

7266
12
7279

31011
1
31012

NATIONAL EMISSIONS DATA SYSTEM

REGIONAL COMPLETION AGENCY

COUNTY EMISSIONS REPORT
CLACK COUNTY, NEVADA

RUN DATE: TUESDAY FEBRUARY 07, 1976
EMISSIONS AS OF: TUESDAY FEBRUARY 03, 1976

PARTICULATES TONS / YR	SOX TONS / YR	NOX TONS / YR	HC TONS / YR	CO TONS / YR
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FUEL COMBUSTION

EXTERNAL COMBUSTION

RESIDENTIAL FUEL (AREA)

DISTILLATE OIL	2	6	2	1	1
NATURAL GAS	26	2	212	21	53
WOOD	11	1	5	9	9
TOTAL (RESIDENTIAL)	40	8	219	31	63

FIRE GENERATION (POINT)

BITUMINOUS COAL	6558	50171	88966	922	3075
RESIDUAL OIL	16	317	212	4	6
DISTILLATE OIL	0	4	13	0	0
NATURAL GAS	81	6	6410	11	182
TOTAL (FIRE GEN)	6655	60498	95601	937	3263

INDUSTRIAL FUEL

RESIDUAL OIL	16	112	48	2	3
DISTILLATE OIL	44	84	174	9	12
NATURAL GAS	53	238	1535	67	32
TOTAL (INDUSTRIAL)	113	434	1757	78	47
AREA SOURCES	113	434	1757	78	47
POINT SOURCES	0	196	217	11	14
TOTAL (INDUSTRIAL)	113	630	1974	89	61

COMM-INSTITUTIONAL FUEL

RESIDUAL OIL	21	146	55	3	4
DISTILLATE OIL					

AREA SOURCES

75

143

298

15

20

NATURAL GAS

AREA SOURCES

TOTAL (COMM-INST)

AREA SOURCES

TOTAL (INTERNAL COMB)

AREA SOURCES

POINT SOURCES

INTERNAL COMBUSTION (POINT)

ELECTRIC GENERATION

DISTILLATE OIL

NATURAL GAS

TOTAL (ELEC GEN)

TOTAL (INTERNAL COMB)

TOTAL (FUEL COMBUSTION)

AREA SOURCES

POINT SOURCES

INDUSTRIAL PROCESS (POINT)

CHEMICAL MANUFACTURING

PRIMARY METAL

MINERAL PRODUCTS

EVAPORATION

IMPROCESS FUEL

OTHER/NOT CLASSIFIED

TOTAL (INDUSTRIAL)

SOLID WASTE DISPOSAL

COMMERCIAL-INSTITUTIONAL

ON SITE INCINERATION

AREA SOURCES

TOTAL (COMM-INST)

AREA SOURCES

TOTAL (SOLID WASTE DISP)

AREA SOURCES

TRANSPORTATION (AREA)

LAND VEHICLES

GASOLINE

84

108

185

3295

4

69

73

73

185

3368

0

3000

0

0

0

0

0

3000

5

5

5

83347

13864

8808

270

1040

LIGHT VEHICLES

694
8404161
1392522
84301
2712
1042OFF HIGHWAY
TOTAL (GASOLINE)

DIESEL

1382
69
1451303
50
3522397
146
2593265
30
295149
13
203HEAVY VEHICLES
MAIL
TOTAL (DIESEL)

AIRCRAFT

2433
732
3031
61962266
128
1469
3864468
26
1114
1613186
6
115
307474
24
40
1063MILITARY
CIVIL
COMMERCIAL
TOTAL (AIRCRAFT)

VESSELS

3866
38661216
121636
368
80
0GASOLINE
TOTAL (VESSELS)

GAS HANDLING EVAP LOSS

0
955542144
215010
130710
8810
2328

TOTAL (TRANSPORTATION)

MISCELLANEOUS (AREA)
*****168
0
16829
1093
11225
0
50
0
020
0
20FOREST FIRES
SOLVENT EVAPORATION LOSS
TOTAL (MISCELLANEOUS)GRAND TOTAL
*****95913
6368
10228022718
1499
2421714372
97901
1122721378
41018
623962649
75346
77975AREA SOURCES
PAINT SOURCES
TOTAL